



**Mitsubishi Electric Selection software (MELSELECT)  
for Mitsubishi Electric low-voltage circuit breaker  
User manual**

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# 1. Introduction

This user manual explains how to use Mitsubishi Electric Selection software, MELSELECT (Ver.1.2.0) for low-voltage circuit breaker.

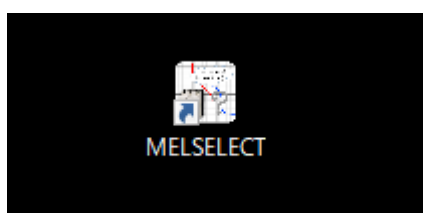
## 1.1 System requirements

Item	Recommended requirements
Operating system (OS)	Microsoft Windows10 (32/64 bit) Pro
Software execution environment	Microsoft .NET Framework 4.6
Report output software	Microsoft Word 2016

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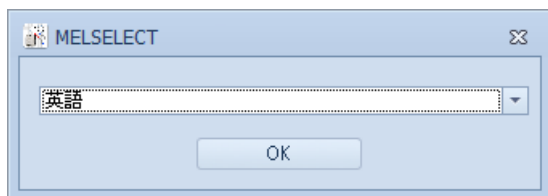
## 1.2 Start MELSELECT

- (1) Download MELSELECT and decompress the compressed folder.
- (2) Install MELESELECT by [MeleselectSetup.msi] in the decompressed folder.
- (3) Open MELESELECT from a created below shortcut on a desktop.



- (4) For the first time of starting up MELSELECT, a screen of language selection is displayed. Select language (English/Chinese/Japanese) and click OK.

※The language selection is not displayed at the second and subsequent startups.

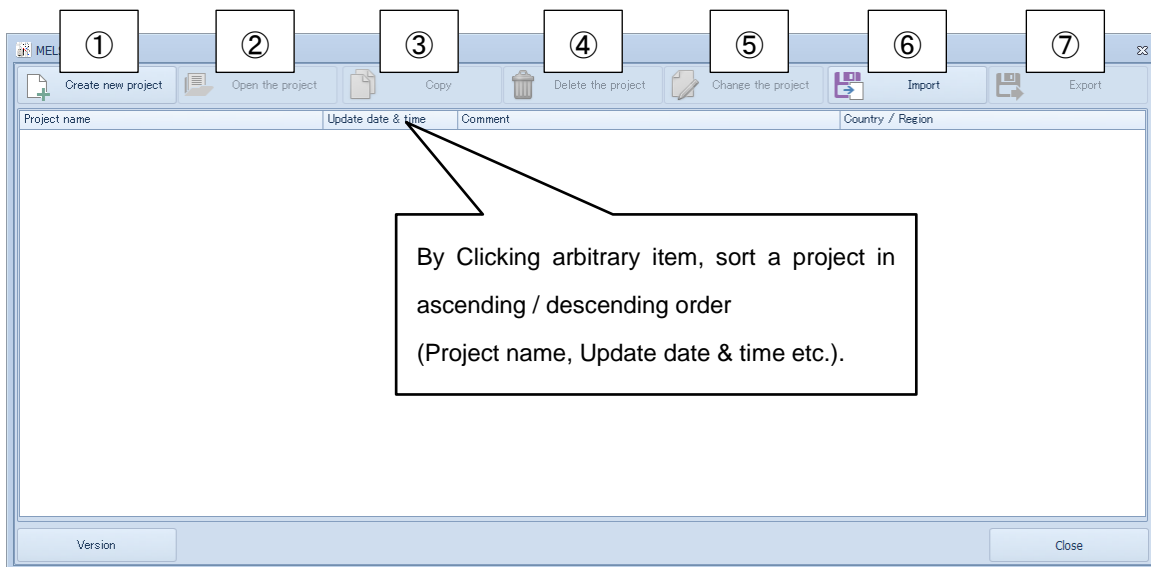


## 2. Project management

At the project management window which displayed in startup of MELESELECT, following operations are available.

Table1. Project management function list

No	Item	Function
①	Create new project	To create new project
②	Open the project	To open and show single-line diagram of selected project
③	Copy	To copy selected project and create a project of new name
④	Delete the project	To delete selected project
⑤	Change the project	To change project information of selected project
⑥	Import	To import project file from arbitrary folder
⑦	Export	To export selected project to arbitrary folder as project file



The project is listed by a created order and they can sort in ascending / descending order by clicking a tabs such as Project name/Update date & time etc.

## 2.1 Create new project

- (1) Click [Create new project] button, create the new project.
- (2) Enter “Project name” (Required), “Comment” and select “Country/Region” (Required) in the project setting.
- (3) Enter each parameter of “Project information” and “Report information” tabs.

① Click [Create new project].

② Enter Project name, Comment, Country/Region.

③ Enter Project information: System, Model selection, LV cable, Busbar, Busduct, Margin.

MELSELECT

Create new project Open the project Copy Delete the project Change the project Import Export

Project name Update date & time Comment Country / Region

Project setting

Project name: Sample project

Comment:

Country / Region: Singapore

Project information Report information

System

Frequency: 50 Hz

Max. allowable voltage drop: 5 %

Model selection

Priority of model selection: Adjustable type

LV cable

Maximum permissible cable cross section: 300 mm<sup>2</sup>

Cable ambient temperature: 30 °C

Cable maximum permissible voltage drop default value: 2 %

Busbar

Busbar ambient temperature: 35 °C

Busbar max. voltage drop: 2 %

Busduct

Busduct ambient temperature: 40 °C

Busduct max. voltage drop: 2 %

margin

Breaker rated current margin of load current: 125 %

OK Close

Table 2. The tab setting items for Project information

Group	Setting item	Range	Contents
System	Frequency [Hz]	50/60	Select frequency of system
	Maximum allowable voltage drop [%]	0-10 (Integer)	Enter allowable voltage drop in the whole of systems
Model selection	Priority of model selection	Adjustable type/Fixed type	Select a type which is preferentially displayed when selecting models (Adjustable type can be selected even if fixed type is selected)
LV cable	Maximum permissible cable cross section [mm <sup>2</sup> ]	95/120/150/185/240/300/400/500/630/800/1000	Select a maximum permissible cable cross-section area when selecting a cross section
	Cable ambient temperature [°C]	10/15/20/25/30/35/40/45/50/55/60	Select ambient temperature
	Cable maximum permissible voltage drop default value [%]	0-10 (Integer)	Specify the maximum permissible voltage drop of cable
Busbar	Busbar ambient temperature [°C]	10/15/20/25/30/35/40/45/50/55/60	Select ambient temperature of busbar
	Busbar max. voltage drop [%]	0-10 (Integer)	Specify the maximum allowable voltage drop of busbar
Busduct	Busduct ambient temperature [°C]	10/15/20/25/30/35/40	Select ambient temperature of busduct
	Busduct max. voltage drop [%]	0-10 (Integer)	Specify the maximum allowable voltage drop of busduct
Margin	Breaker rated current margin of load current [%]	115/120/125	Specify added margin when selecting rated current of breaker

(4) Information which is entered at [Report information] tab is listed on output report. (Entry is optional)

The screenshot shows the MELSELECT software interface. A 'Project setting' dialog box is open, displaying the 'Report information' tab. The dialog box has a title bar with 'MELSELECT' and a close button. Below the title bar is a menu bar with options: 'Create new project', 'Open the project', 'Copy', 'Delete the project', 'Change the project', 'Import', and 'Export'. The main area of the dialog is divided into three sections: 'Project setting', 'Project information', and 'Report information'. The 'Report information' tab is selected, showing fields for 'Company' (Mitsubishi Electric Corporation), 'Address' (1-8 Midori-machi, Fukuyama, Hiroshima, Japan), and 'Project' (Sample project, Singapore). A red bracket highlights the 'Report information' section, with a callout indicating '⑤ Enter Report information.'. Another callout points to the 'Report information' tab, indicating '④ Click [Report information]'. A third callout points to the 'OK' button at the bottom, indicating '⑥ Click [OK]'. The 'Close' button is also visible at the bottom right.

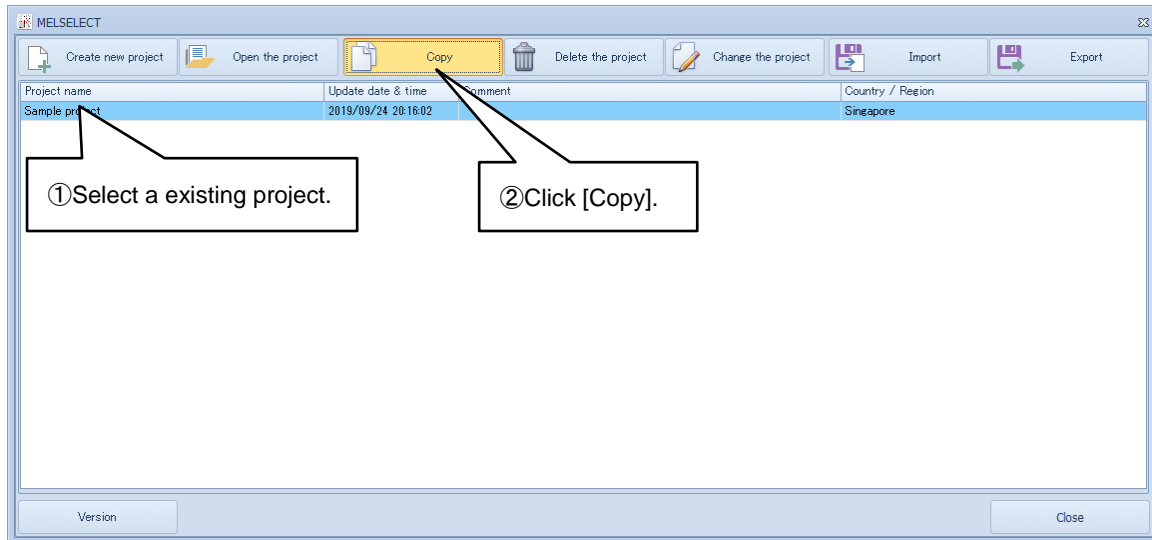
(5) After clicking [OK] button, the project of setup contents is created.

※All of contents except [Project name] can change after creating the project (After clicking [OK] button)

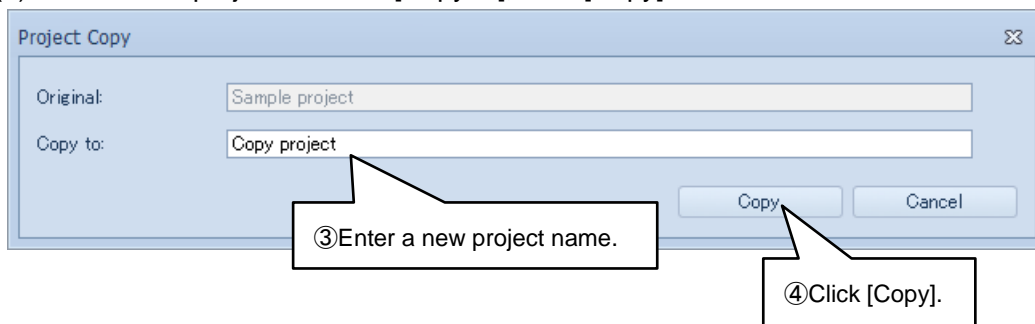
[Project name] cannot change after creating the project. (After clicking [OK] button)

## 2.2 Divert existing project and create project

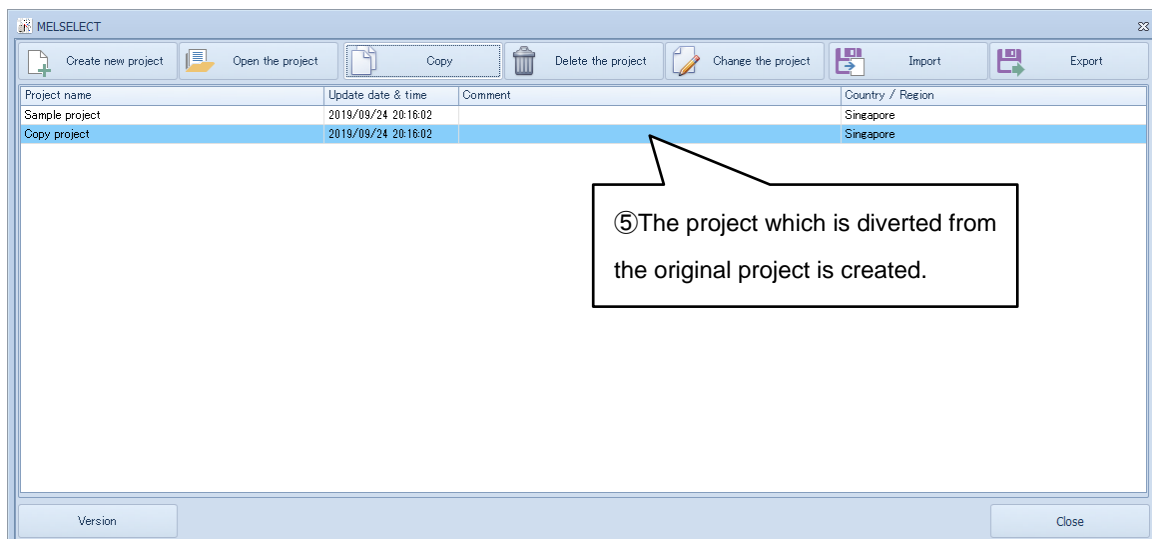
(1) Select an existing project in the project management window, click [Copy] button.



(2) Enter a new project name to [Copy to], click [Copy].



(3) The original project is copied, then the diversion project is created with the set project name.

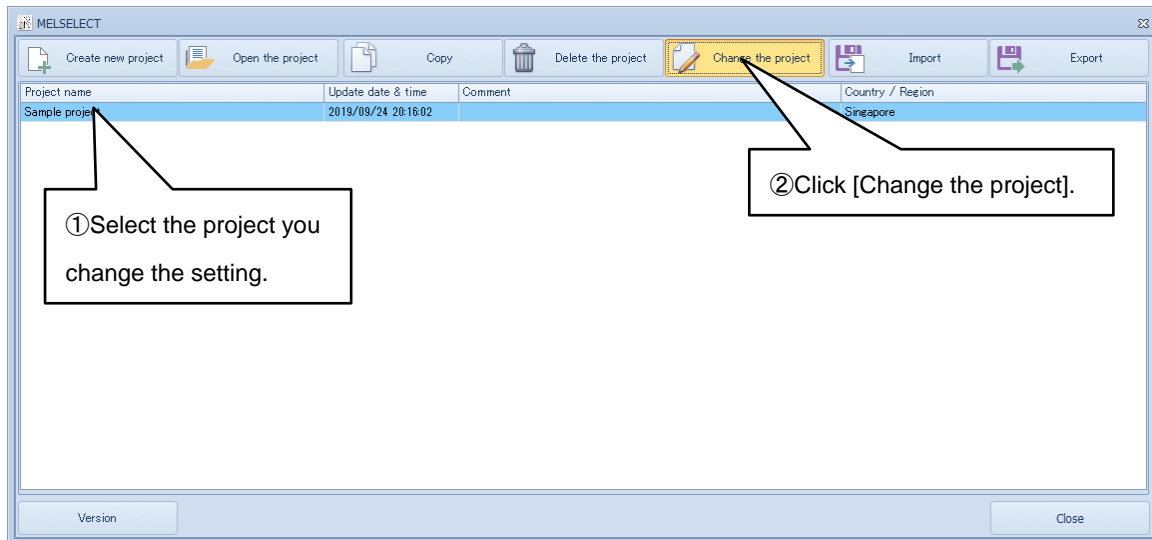


※At the time of copy, the update date and time retain the original value.



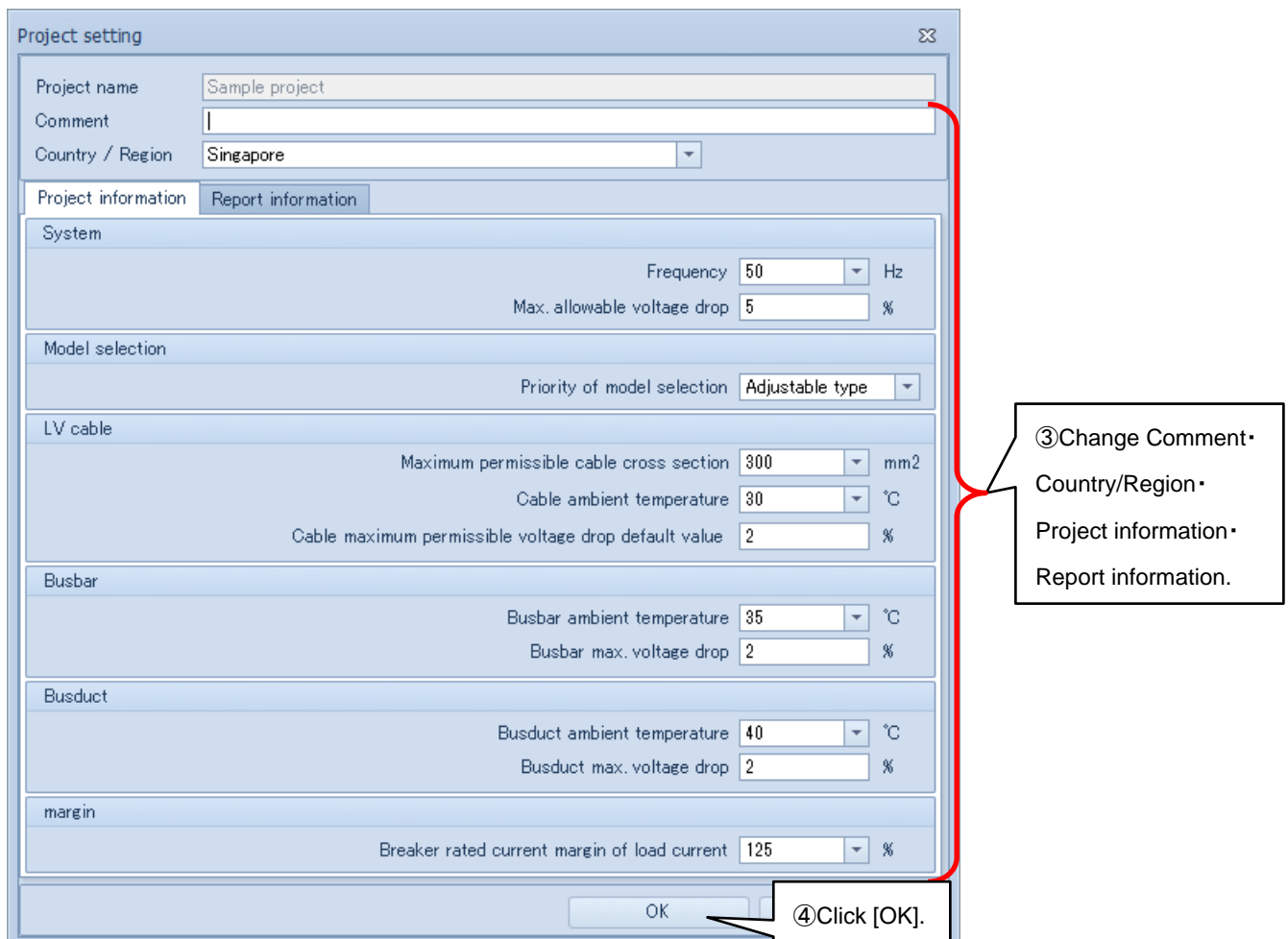
## 2.3 Change project setting

(1) Click the project which you change of setting in the project management window, click [Change the project] button.



(2) All information except the project name is changeable.

(3) Click [OK] button, the project of changed contents are updated.

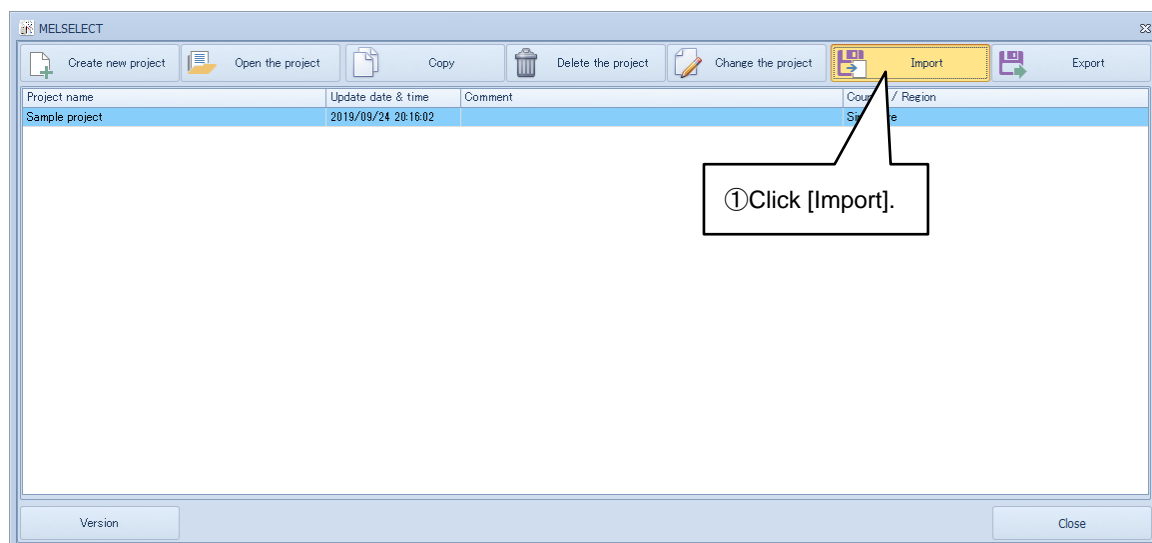


※The updated date and time are updated by the clock time of completed change of setting.

## 2.4 Import project

MELESELECT can import the project file of extension .mel.

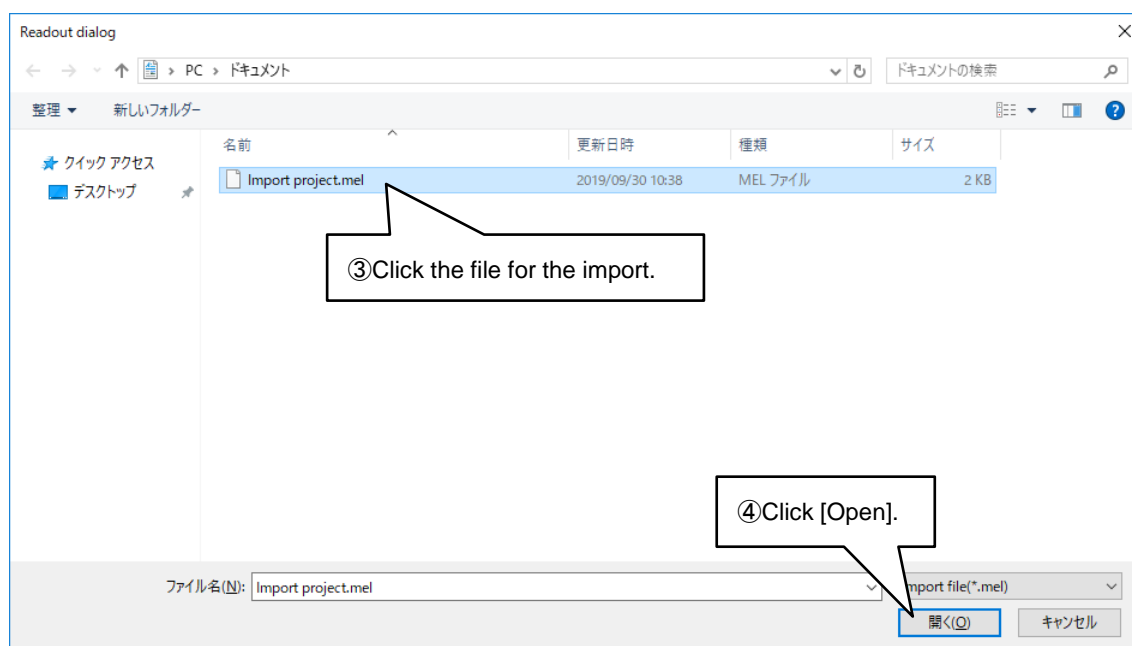
(1) Click [Import] in the screen of the project management window.



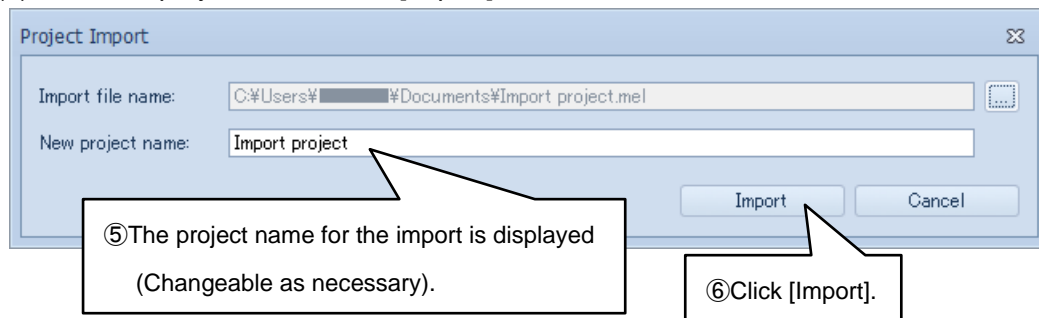
(2) Click [...] button



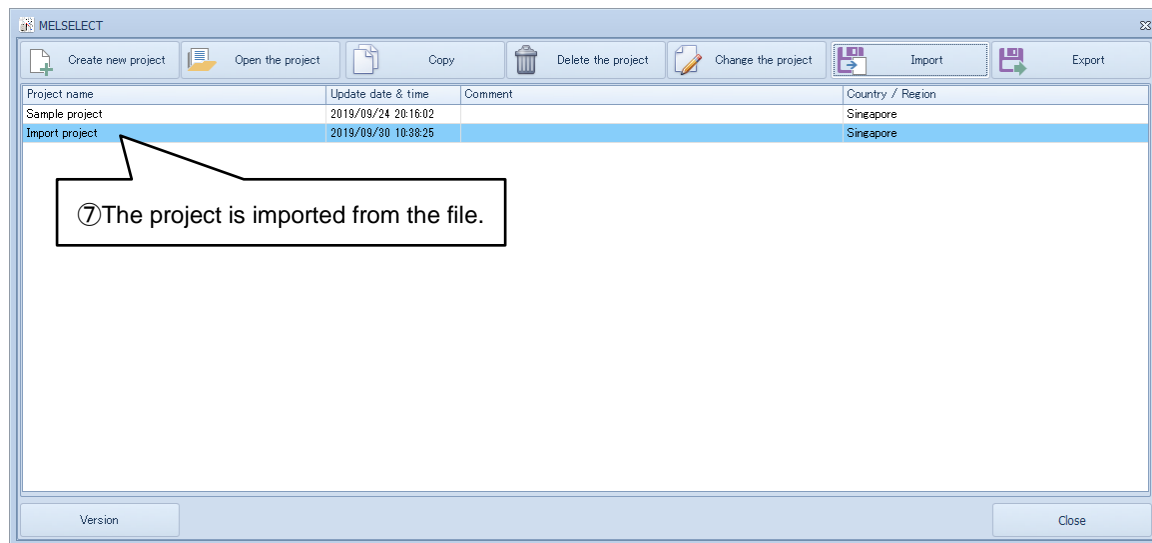
(3) Select the file of .mel for the import, click [Open]



(4) Enter the project name, click [Import] button.



(5) The project is imported.

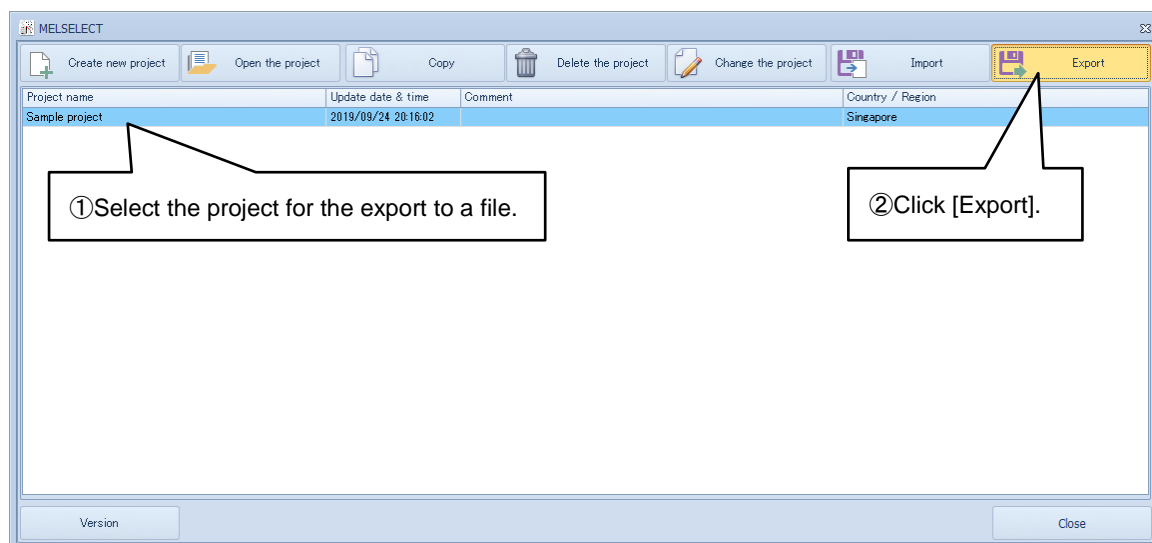


※At the time of the import, the updated date and time retain the value of the import file.

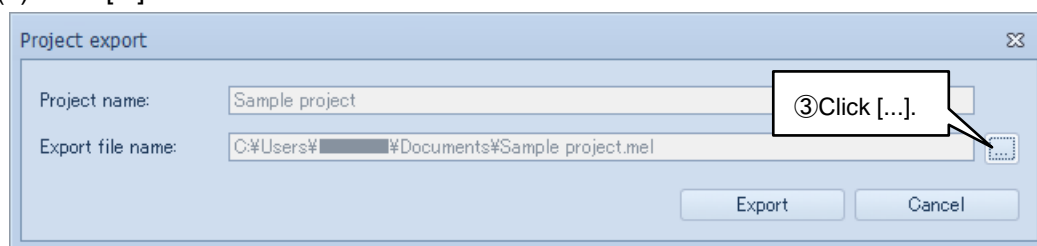
## 2.5 Export project

MELSELECT can export the project as a project file of extension .mel.

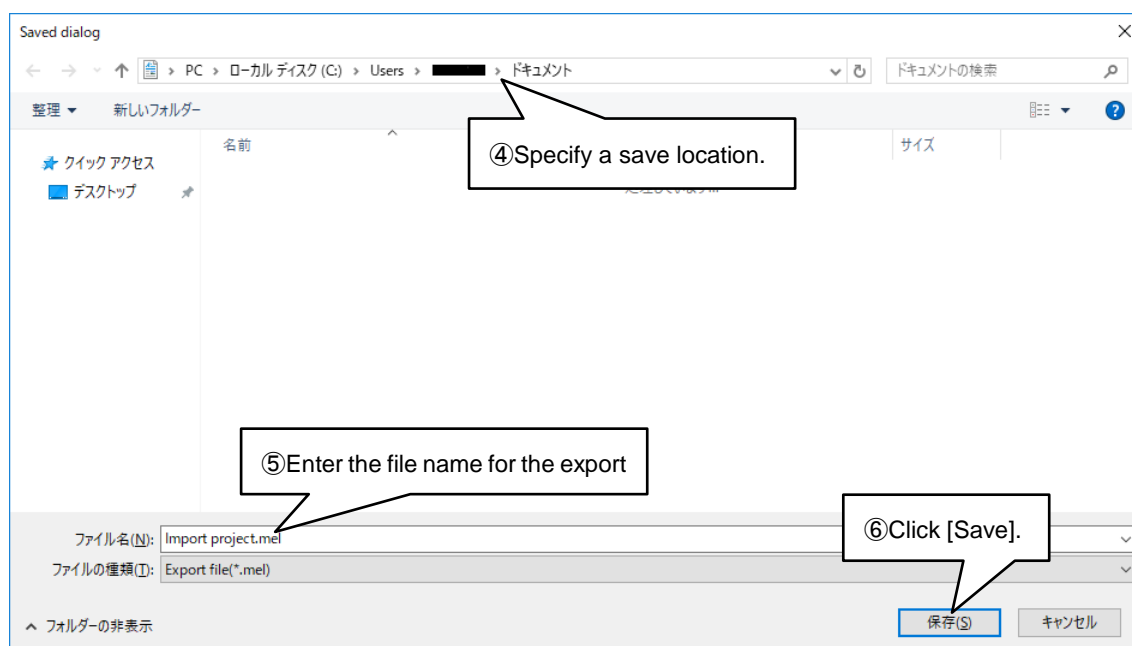
(1) In the project management window, select the project which you export to a file, and click [Export].



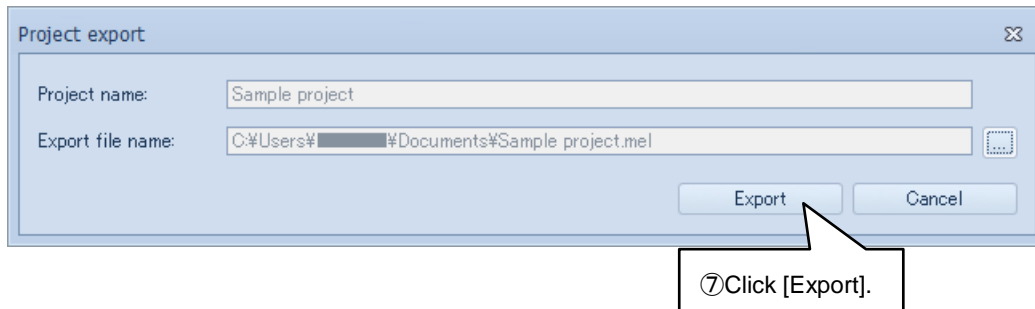
(2) Click [...] button.



(3) Specify a save location and the file name for the export of the project, click [Save] button.



(4) After clicking [Export] button, the .mel file is created to the specified save location.



## 3. Create single-line diagram

### 3.1 Draw single-line diagram

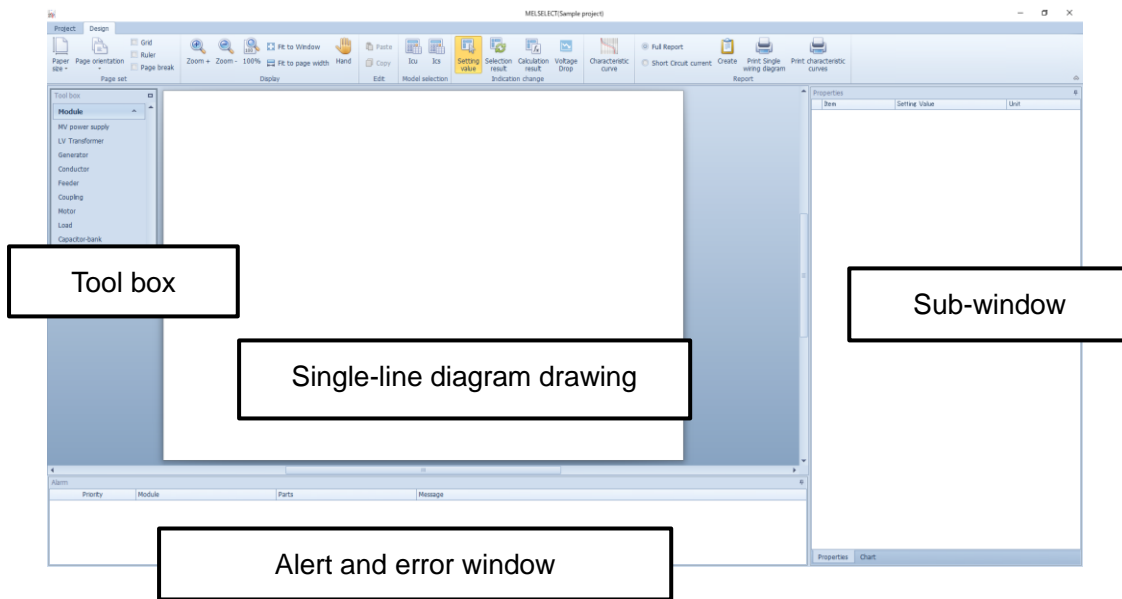
(1) Open the project which edits single-line diagram in the project management window.

It is consisted four screens.

- Single-line diagram drawing area Main screen. Put module, display information of each element
- Tool box Select the module for put
- Sub-window Enter information of element, display breaker characteristic curve
- Display alert, error window Alert, error are displayed

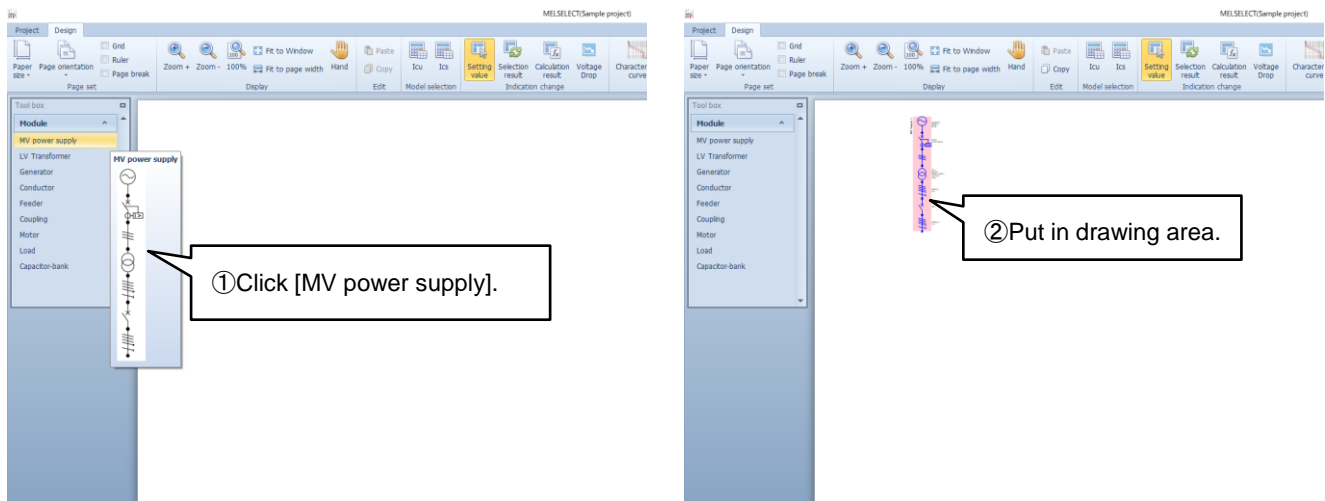
(2) Select module from Tool box on left side and put them to draw single-line diagram.

It is able to put up to 200 modules in single-line diagram drawing area.

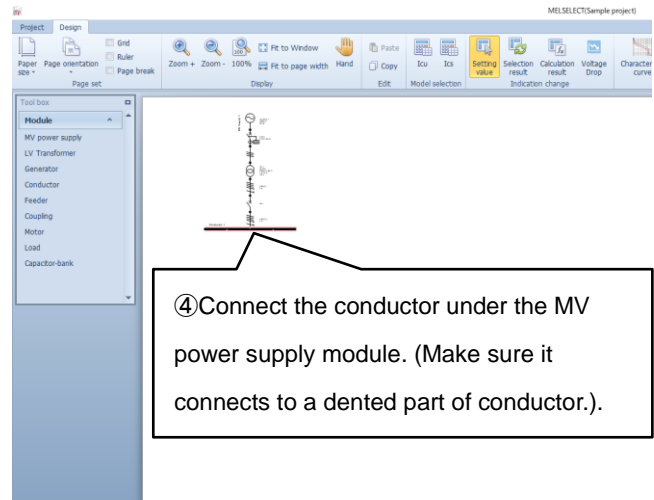
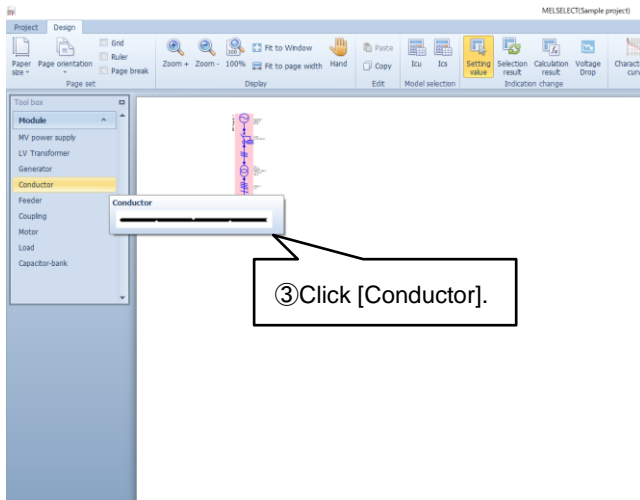


(ex: The drawing in the case of creating single-line diagram including general load and motor load)

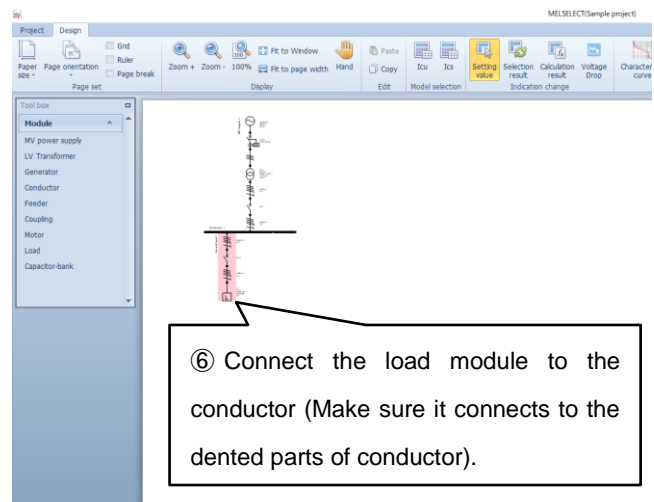
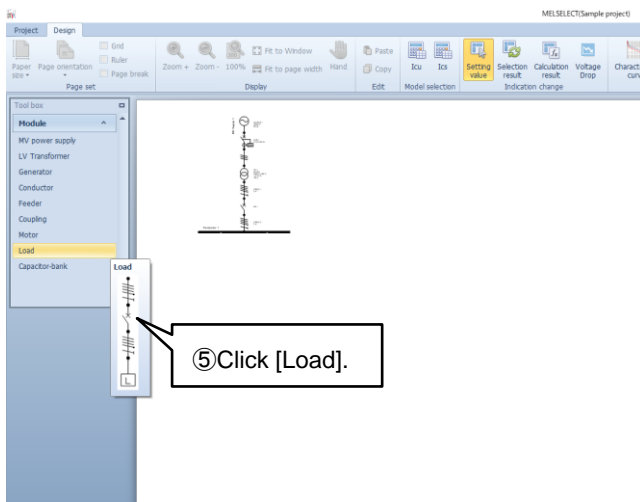
[1] Click [MV power supply] in Tool box and put it in drawing area.



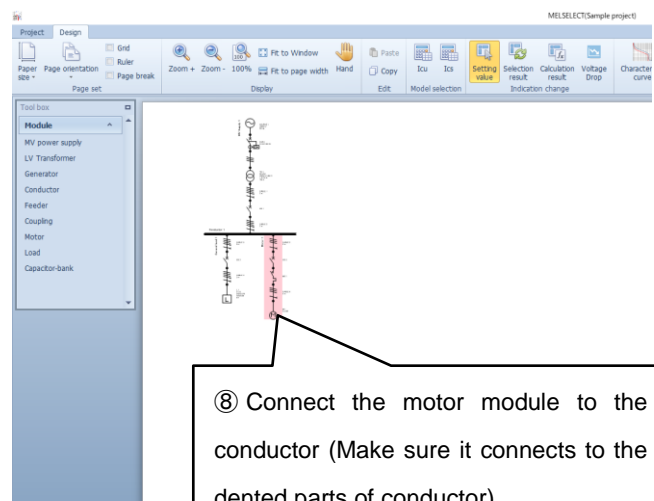
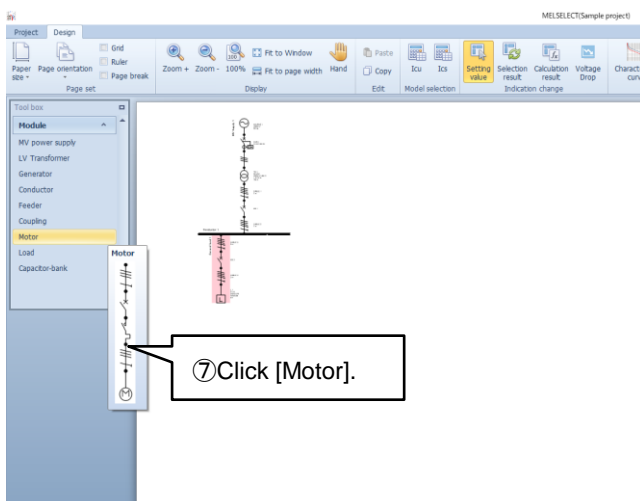
[2] Click [Conductor] in the tool box and put it under the [MV power supply].



[3] Click [Load] in the tool box and put it under [Conductor].

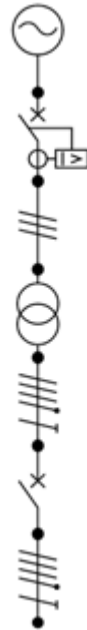



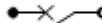
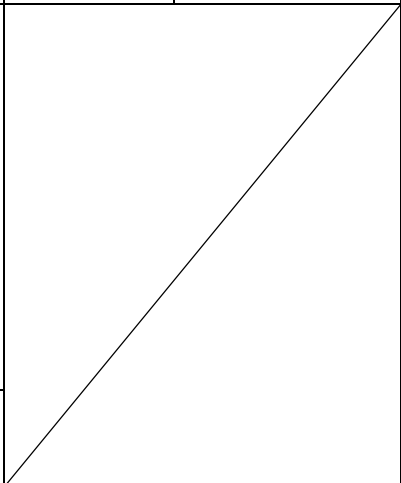



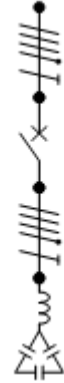


[4] Click [Motor] in the tool box and put it under [Conductor].



[5] After creating single-line diagram, click [Project] tab on the upper left and click [Save].

Table 3. Usable Module list

Item	Module	Item	Module	Item	Module
MV power supply		LV Transformer		Generator	
Feeder		Coupling			
Conductor					
Motor		Load		Capacitor-bank	



## 3.2 Set each element parameter

- (1) The parameters of each element which were put in the drawing area are changeable. Set them before the short-circuit calculation.
- (2) Click each element and set parameter in [Properties] window on the right side according to a condition and a purpose. Main changeable parameters are as follows.

Table 4. Main Changeable parameters

Elements	Changeable parameters
Power	Voltage/Short-circuit capacity
Protection relay	Type/MV protection device
Transformer	Secondary voltage/Earthing system/Transformer capacity
Generator	Voltage/Power distribution system/Capacity/Transient reactance/Sub-transient reactance/DC time constant/Sub-transient time constant
Cable	Length/Conductor material (Phase)/Conductor material (PE)/Insulating material/Cable arrangement
Busbar	Length/Conductor material (Phase)/Conductor material (PE)/Horizontal installation factor/Proximity effect factor
Busduct	Length/Number of poles/Conductor material (Phase)/Conductor material (PE)
Breaker	Type of circuit breakers/Number of poles/Residual current protection/Electronic trip relay (ACB only)
Capacitor-bank	Installed capacity/Reactor
Load	Load current/Power factor/Capacity/Output
Motor	Starting method/Output

(ex: In the case of changing the parameters of single-line diagram created at 3.1.).

- [1] Click Power in the single-line diagram and change [Voltage].

The screenshot shows the software interface with a single-line diagram on the left and the Properties window on the right. The Properties window is open for the 'Power' element, showing a list of parameters and their values. A callout box points to the 'Voltage' parameter, which is set to 22000 V. Another callout box points to the 'Short-circuit capacity' parameter, which is set to 3000 kVA. A third callout box points to the 'X/R' parameter, which is set to 6000. A fourth callout box points to the '%Z' parameter, which is set to 6600. A fifth callout box points to the 'Voltage' parameter, which is set to 22000 V. A sixth callout box points to the 'Short-circuit capacity' parameter, which is set to 3000 kVA. A seventh callout box points to the 'X/R' parameter, which is set to 6000. An eighth callout box points to the '%Z' parameter, which is set to 6600. A ninth callout box points to the 'Voltage' parameter, which is set to 22000 V. A tenth callout box points to the 'Short-circuit capacity' parameter, which is set to 3000 kVA. A eleventh callout box points to the 'X/R' parameter, which is set to 6000. A twelfth callout box points to the '%Z' parameter, which is set to 6600. A thirteenth callout box points to the 'Voltage' parameter, which is set to 22000 V. A fourteenth callout box points to the 'Short-circuit capacity' parameter, which is set to 3000 kVA. A fifteenth callout box points to the 'X/R' parameter, which is set to 6000. A sixteenth callout box points to the '%Z' parameter, which is set to 6600. A seventeenth callout box points to the 'Voltage' parameter, which is set to 22000 V. An eighteenth callout box points to the 'Short-circuit capacity' parameter, which is set to 3000 kVA. A nineteenth callout box points to the 'X/R' parameter, which is set to 6000. A twentieth callout box points to the '%Z' parameter, which is set to 6600. A twenty-first callout box points to the 'Voltage' parameter, which is set to 22000 V. A twenty-second callout box points to the 'Short-circuit capacity' parameter, which is set to 3000 kVA. A twenty-third callout box points to the 'X/R' parameter, which is set to 6000. A twenty-fourth callout box points to the '%Z' parameter, which is set to 6600. A twenty-fifth callout box points to the 'Voltage' parameter, which is set to 22000 V. A twenty-sixth callout box points to the 'Short-circuit capacity' parameter, which is set to 3000 kVA. A twenty-seventh callout box points to the 'X/R' parameter, which is set to 6000. A twenty-eighth callout box points to the '%Z' parameter, which is set to 6600. A twenty-ninth callout box points to the 'Voltage' parameter, which is set to 22000 V. A thirtieth callout box points to the 'Short-circuit capacity' parameter, which is set to 3000 kVA. A thirty-first callout box points to the 'X/R' parameter, which is set to 6000. A thirty-second callout box points to the '%Z' parameter, which is set to 6600. A thirty-third callout box points to the 'Voltage' parameter, which is set to 22000 V. A thirty-fourth callout box points to the 'Short-circuit capacity' parameter, which is set to 3000 kVA. A thirty-fifth callout box points to the 'X/R' parameter, which is set to 6000. A thirty-sixth callout box points to the '%Z' parameter, which is set to 6600. A thirty-seventh callout box points to the 'Voltage' parameter, which is set to 22000 V. A thirty-eighth callout box points to the 'Short-circuit capacity' parameter, which is set to 3000 kVA. A thirty-ninth callout box points to the 'X/R' parameter, which is set to 6000. A fortieth callout box points to the '%Z' parameter, which is set to 6600. A forty-first callout box points to the 'Voltage' parameter, which is set to 22000 V. A forty-second callout box points to the 'Short-circuit capacity' parameter, which is set to 3000 kVA. A forty-third callout box points to the 'X/R' parameter, which is set to 6000. A forty-fourth callout box points to the '%Z' parameter, which is set to 6600. A forty-fifth callout box points to the 'Voltage' parameter, which is set to 22000 V. A forty-sixth callout box points to the 'Short-circuit capacity' parameter, which is set to 3000 kVA. A forty-seventh callout box points to the 'X/R' parameter, which is set to 6000. A forty-eighth callout box points to the '%Z' parameter, which is set to 6600. A forty-ninth callout box points to the 'Voltage' parameter, which is set to 22000 V. A fiftieth callout box points to the 'Short-circuit capacity' parameter, which is set to 3000 kVA. A fifty-first callout box points to the 'X/R' parameter, which is set to 6000. A fifty-second callout box points to the '%Z' parameter, which is set to 6600. A fifty-third callout box points to the 'Voltage' parameter, which is set to 22000 V. A fifty-fourth callout box points to the 'Short-circuit capacity' parameter, which is set to 3000 kVA. A fifty-fifth callout box points to the 'X/R' parameter, which is set to 6000. A fifty-sixth callout box points to the '%Z' parameter, which is set to 6600. A fifty-seventh callout box points to the 'Voltage' parameter, which is set to 22000 V. A fifty-eighth callout box points to the 'Short-circuit capacity' parameter, which is set to 3000 kVA. A fifty-ninth callout box points to the 'X/R' parameter, which is set to 6000. A sixtieth callout box points to the '%Z' parameter, which is set to 6600. A sixty-first callout box points to the 'Voltage' parameter, which is set to 22000 V. A sixty-second callout box points to the 'Short-circuit capacity' parameter, which is set to 3000 kVA. A sixty-third callout box points to the 'X/R' parameter, which is set to 6000. A sixty-fourth callout box points to the '%Z' parameter, which is set to 6600. A sixty-fifth callout box points to the 'Voltage' parameter, which is set to 22000 V. A sixty-sixth callout box points to the 'Short-circuit capacity' parameter, which is set to 3000 kVA. A sixty-seventh callout box points to the 'X/R' parameter, which is set to 6000. A sixty-eighth callout box points to the '%Z' parameter, which is set to 6600. A sixty-ninth callout box points to the 'Voltage' parameter, which is set to 22000 V. A seventieth callout box points to the 'Short-circuit capacity' parameter, which is set to 3000 kVA. A seventy-first callout box points to the 'X/R' parameter, which is set to 6000. A seventy-second callout box points to the '%Z' parameter, which is set to 6600. A seventy-third callout box points to the 'Voltage' parameter, which is set to 22000 V. A seventy-fourth callout box points to the 'Short-circuit capacity' parameter, which is set to 3000 kVA. A seventy-fifth callout box points to the 'X/R' parameter, which is set to 6000. A seventy-sixth callout box points to the '%Z' parameter, which is set to 6600. A seventy-seventh callout box points to the 'Voltage' parameter, which is set to 22000 V. A seventy-eighth callout box points to the 'Short-circuit capacity' parameter, which is set to 3000 kVA. A seventy-ninth callout box points to the 'X/R' parameter, which is set to 6000. An eightieth callout box points to the '%Z' parameter, which is set to 6600. An eighty-first callout box points to the 'Voltage' parameter, which is set to 22000 V. An eighty-second callout box points to the 'Short-circuit capacity' parameter, which is set to 3000 kVA. An eighty-third callout box points to the 'X/R' parameter, which is set to 6000. An eighty-fourth callout box points to the '%Z' parameter, which is set to 6600. An eighty-fifth callout box points to the 'Voltage' parameter, which is set to 22000 V. An eighty-sixth callout box points to the 'Short-circuit capacity' parameter, which is set to 3000 kVA. An eighty-seventh callout box points to the 'X/R' parameter, which is set to 6000. An eighty-eighth callout box points to the '%Z' parameter, which is set to 6600. An eighty-ninth callout box points to the 'Voltage' parameter, which is set to 22000 V. A ninetieth callout box points to the 'Short-circuit capacity' parameter, which is set to 3000 kVA. A ninety-first callout box points to the 'X/R' parameter, which is set to 6000. A ninety-second callout box points to the '%Z' parameter, which is set to 6600. A ninety-third callout box points to the 'Voltage' parameter, which is set to 22000 V. A ninety-fourth callout box points to the 'Short-circuit capacity' parameter, which is set to 3000 kVA. A ninety-fifth callout box points to the 'X/R' parameter, which is set to 6000. A ninety-sixth callout box points to the '%Z' parameter, which is set to 6600. A ninety-seventh callout box points to the 'Voltage' parameter, which is set to 22000 V. A ninety-eighth callout box points to the 'Short-circuit capacity' parameter, which is set to 3000 kVA. A ninety-ninth callout box points to the 'X/R' parameter, which is set to 6000. A hundredth callout box points to the '%Z' parameter, which is set to 6600.

①Click Power (SOURCE1).

②Change power setting on sub-window.

Voltage: 22000V

[2] Click Transformer in the single-line diagram and change “Secondary voltage” and “Transformer capacity”.

①Click Transformer (TR1).

Item	Setting Value	Unit
Primary voltage	22000	V
Secondary voltage	400	V
Earthing system	TN-S	
Transformer capacity	250	kVA
Current	20	
%Z	30	
X/R	75	

②Change transformer setting on the sub-window.

- Secondary voltage: 400V
- Transformer capacity: 250kVA

[3] Click Breaker (CB1) in the single-line diagram and change “Type of circuit breakers”, “Electronic trip relay” and “Residual current protection” etc.

①Click Breaker (CB1).

Item	Setting Value	Unit
Type	Circuit breakers	
Type of circuit breakers	ACB	
Number of poles	4P(3P+N)	
Residual current protection	No	
Electronic trip relay	for General use(WS)	
Model	for General use(WS)	

②Change breaker setting in the sub-window.

- Type of circuit breakers: ACB
- Residual current protection: No
- Electronic trip relay: for General use (WS)

③Click Breaker (CB2).

Item	Setting Value	Unit
Type	Circuit breakers	
Type of circuit breakers	MCCB	
Number of poles	4P(3P+N)	
Residual current protec...	No	
Model	Yes No	

④Change breaker setting on the sub-window.

- Type of circuit breakers: MCCB
- Residual current protection: No.

⑤Click Breaker (CB3).

Item	Setting Value	Unit
Type	Circuit breakers	
Type of circuit breakers	MCCB	
Number of poles	3P	
Residual current protec...	Yes	
Model	Yes No	

⑥Change Breaker setting on the sub-window.

- Type of circuit breakers: MCCB
- Residual current protection: Yes

[4] Click Load in the single-line diagram and change “Load current” and “Power factor”.

①Click Load (L1).

②Change load setting on the sub-window.

- Load current: 80A
- Power factor: 0.9

Item	Setting Value	Unit
Load current	80	A
Power factor	0.9	
Capacity	55.426	kVA
Output		

[5] Click Motor in the single-line diagram and change “Starting method” and “Output”.

①Click Motor (M1).

②Change motor setting on the sub-window.

- Starting method: Star-Delta starting
- Output: :5.5kW

Item	Setting Value	Unit
Starting method	Star-Delta starting	
Output	5.5	kW
Load current	5.5	

[6] Cable setting is also changeable. In this example is the initial setting.

①Click Cable (CABLE1).

②Cable setting

- Cable/Busbar/Busduct
- Length
- Conductor material
- Insulating material

③Click [Cable arrangement]

④It is possible to add a cable installation condition. (Cable only).

- Core configuration
- Wiring systems
- Installation conditions
- Arrangement conditions
- Cable installation method

The setting before short-circuit current calculation is completed.

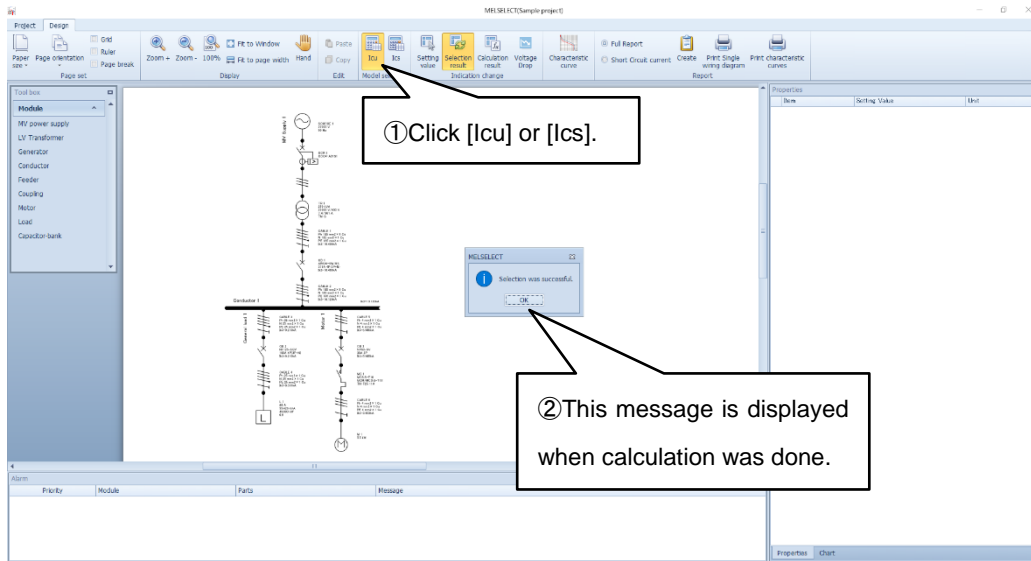
## 4. Calculate short-circuit current and select model

### 4.1 Calculate short-circuit current

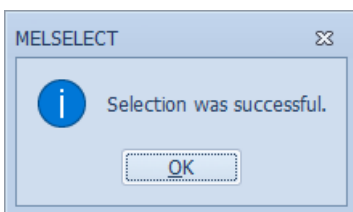
- (1) MELSELECT calculates a short-circuit current of the created single-line diagram at Chapter 3 and selects the suitable model of breaker to protect from the short-circuit current. And, the voltage drop of the system and each conductor is also calculated at the same time.
- (2) The short-circuit current calculation can be based on either [Icu] or [Ics] that are selected according to the conditions and the purpose.

Icu: Rated ultimate short-circuit breaking capacity (IEC60947-2)

Ics: Rated service short-circuit breaking capacity (IEC60947-2)

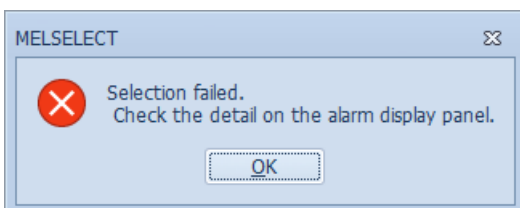


- (3) When short-circuit current calculation was normally completed, "Selection was successful" is displayed in the middle.



- (4) When the short-circuit current calculation has some problems, "Selection failed. Check the detail on the alarm display panel." is displayed in the middle and error message is displayed at the bottom.

According to the error message, change each parameter setting and the calculation conditions and then perform the short-circuit current calculation again.



Note that [Selection result] is selected first after the short-circuit calculation is completed.

By clicking [Selection result], the result of model selection is displayed on the single-line diagram.

By clicking [Voltage drop], the result of the voltage drop calculation is displayed on the single-line diagram.



The following table shows the items displayed on the single-line diagram for each element according to the display switching selection.

Table 5. The list of the items which are displayed on the single-line diagram

Elements	Setting value	Selection result	Calculation result	Voltage drop
Power	Part name	Part name	Part name	Part name
	Voltage	Voltage	Voltage	
	Frequency	Frequency	Frequency	
Protection relay	Part name	Part name	Part name	Part name
	model	model		
Transformer	Part name	Part name	Part name	Part name
	Transformer capacity	Transformer capacity	Transformer capacity	
	Primary voltage	Primary voltage	Primary voltage	
	/Secondary voltage	/Secondary voltage	/ Secondary voltage	
	Primary current	Primary current	Primary current	
	/Secondary current	/ Secondary current	/ Secondary current	
	Earthing system	Earthing system	Earthing system	
Generator	Part name	Part name	Part name	Part name
	Capacity	Capacity	Capacity	
	Voltage	Voltage	Voltage	
	Frequency	Frequency	Frequency	
	Power distribution system	Power distribution system	Power distribution system	



Table 5. The list of the items which are displayed on the single-line diagram

Elements		Setting value	Selection result	Calculation result	Voltage drop
Cable	4P/3P+N	Part name Length	Part name Conductor (Phase) sectional area· Number Material Conductor (N) sectional area· Number Material Conductor (PE) sectional area· Number Material Short-circuit current Ik3	Part name Short-circuit current Ik3 Short-circuit current Ik1 Ground fault current Ik1 (PE)	Part name Voltage drop (Voltage) Voltage drop (Percentage of retention)
	3P	Part name Length	Part name Conductor (Phase) sectional area· Number Material Conductor (N) sectional area· Number Material Conductor (PE) sectional area· Number Material Short-circuit current Ik3	Part name Short-circuit current Ik3 Ground fault current Ik1 (PE)	Part name Voltage drop (Voltage) Voltage drop (Percentage of retention)
	2P	Part name Length	Part name Conductor (Phase) sectional area· Number Material Conductor (N) sectional area· Number Material Conductor (PE) sectional area· Number Material	Part name Line short-circuit current Ik2 Ground fault current Ik1 (PE)	Part name Voltage drop (Voltage) Voltage drop (Percentage of retention)
	1P+N	Part name Length	Part name Conductor (Phase) sectional area· Number Material Conductor (N) sectional area· Number Material Conductor (PE) sectional area· Number Material	Part name Phase to Neutral short-circuit current Ik1 Ground fault current Ik1 (PE)	Part name Voltage drop (Voltage) Voltage drop (Percentage of retention)
Busbar		Part name Length	Part name Conductor (Phase) size Number Conductor (N) size Number Conductor (PE) size Number	Part name Conductor (phase) size Number Conductor (N) size Number Conductor (PE) size Number	Part name Voltage drop (Voltage) Voltage drop (Percentage of retention)

Table 5. The list of the items which are displayed on the single-line diagram (Continued on previous page)

Elements		Setting value	Selection result	Calculation result	Voltage drop
Busduct		Part name Length	Part name Rated current Busduct size Number	Part name Rated current Busduct size Number	Part name Voltage drop (Voltage) Voltage drop (Percentage of retention)
Breaker	4P/3P+N	Part name	Part name Model Rated current Pole number Short-circuit current Ik3	Part name Short-circuit current Ik3 Phase to Neutral short-circuit current Ik1 Ground fault current Ik1 (PE)	Part name
	3P	Part name	Part name Model rated current Pole number Short-circuit current Ik3	Part name Short-circuit current Ik3 Ground fault current Ik1 (PE)	Part name
	2P	Part name	Part name Model Rated current Pole number	Part name Line short-circuit current Ik2 Ground fault current Ik1 (PE)	Part name
	1P+N	Part name	Part name Model Rated current Pole number	Part name Phase to Neutral short-circuit current Ik1 Ground fault current k1 (PE)	Part name
Capacitor-bank		Part name Installed capacity	Part name Installed capacity	Part name Installed capacity	Part name
Load		Part name Load current Capacity Output Power factor	Part name Load current Capacity Output Power factor	Part name Load current Capacity Output Power factor	Part name
Motor		Part name Output	Part name Output	Part name Output	Part name
Contactor		Part name	Part name Model Thermal relay type Rated current	Part name	Part name

※The voltage drop (Percentage of retention) value from the elements of the low-voltage transformer down to the bottom are recalculated an electric potential of low-voltage transformer as the basis (100%).

(6) When you change each parameter setting after the short-circuit current calculation, the calculation results and the selection results is cleared. Calculate by [Icu] or [Ics] again.

## 4.2 Select model

- (1) After short-circuit current calculation (Chapter 4.1), click [Selection result] to show the results of the model selection for each breaker.
- (2) Depending on a calculation results, some models can be selected. Click a breaker (ex: CB1) and select a suitable breaker from “Model” of properties on the right sub-window.

①Click [Selection result] to display the result of a model selection.

②Click [CB1].

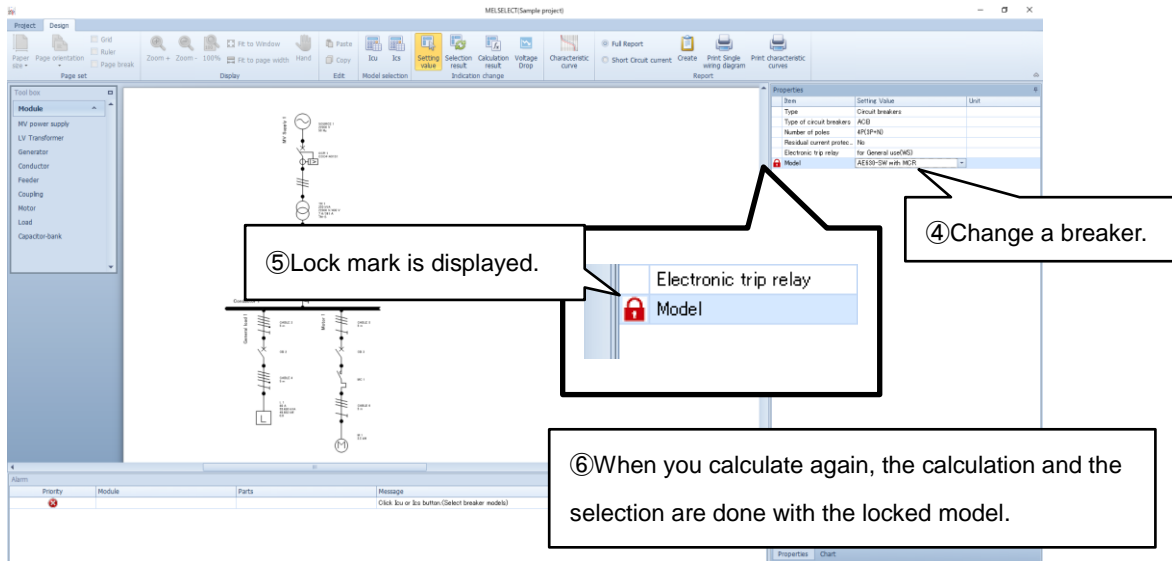
③Suitable breakers are displayed.

Item	Setting Value	Unit
Type	Circuit breakers	
Type of circuit breakers	ACB	
Number of poles	4P(3P+N)	
Residual current protec...	No	
Electronic trip relay	for General use(WS)	
Model	AE630-SW	

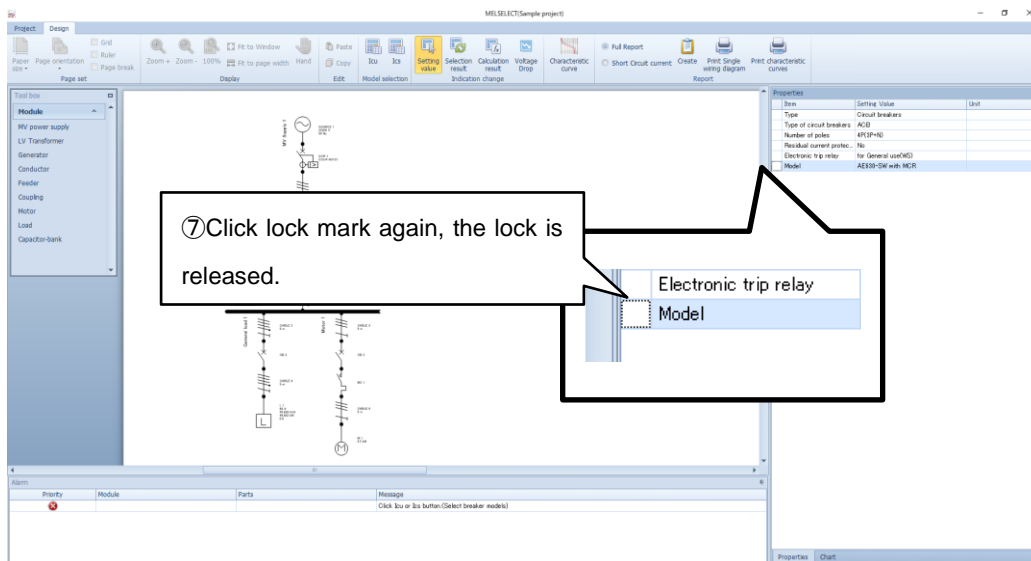
AE630-SW  
 AE630-SW with MCR  
 AE1000-SW with MCR  
 AE1000-SW  
 AE1250-SW with MCR  
 AE1250-SW  
 AE2000-SW with MCR  
 AE2000-SW  
 AE1600-SW  
 AE1600-SW with MCR  
 AE2000-SWA with MCR  
 AE2000-SWA  
 AE2500-SW with MCR  
 AE2500-SW  
 AE3200-SW with MCR  
 AE3200-SW  
 AE4000-SWA with MCR  
 AE4000-SWA  
 AE4000-SW with MCR  
 AE4000-SW

Moreover, if you change the model of breaker, a lock mark is displayed and the model is locked.

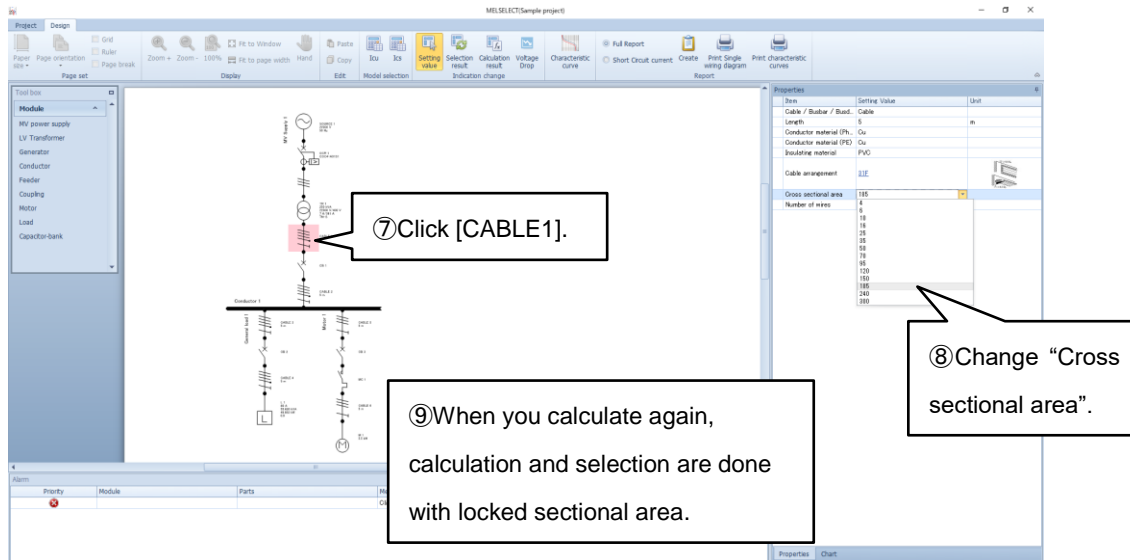
And if you click [Icu] or [Ics] for the calculation again, the calculation and the selection will be done with the selected breaker.



The fixed model can be unlocked by clicking the lock mark.

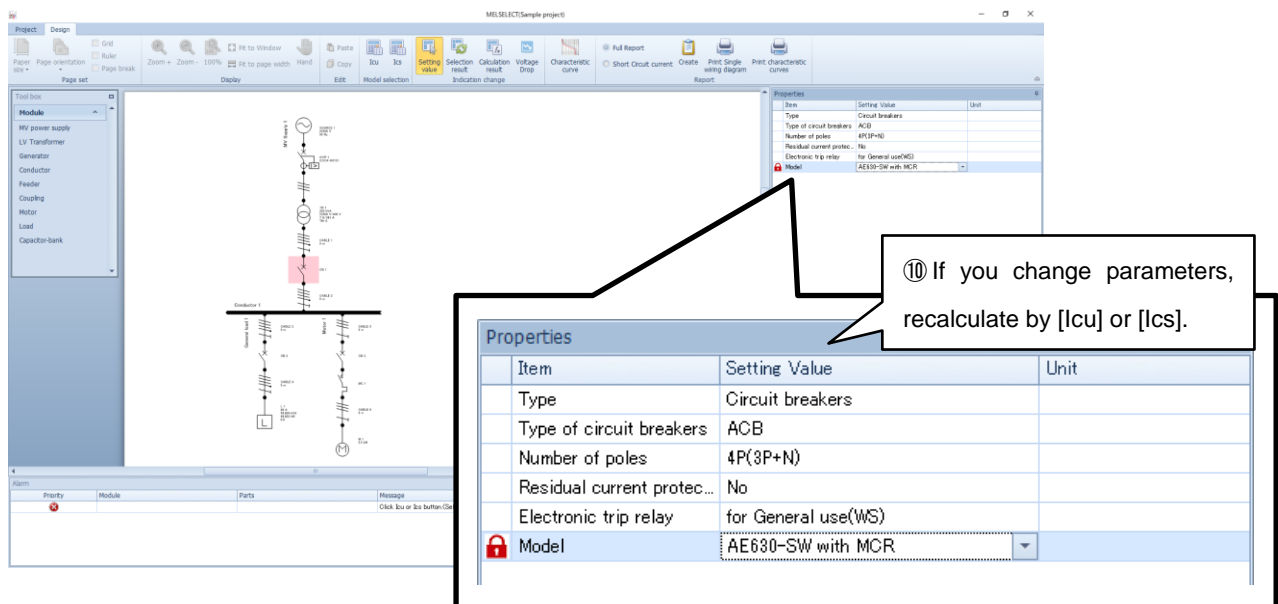


(3) As with breakers, Cable/Busbar/Busduct can be selected and fixed with a lock mark.



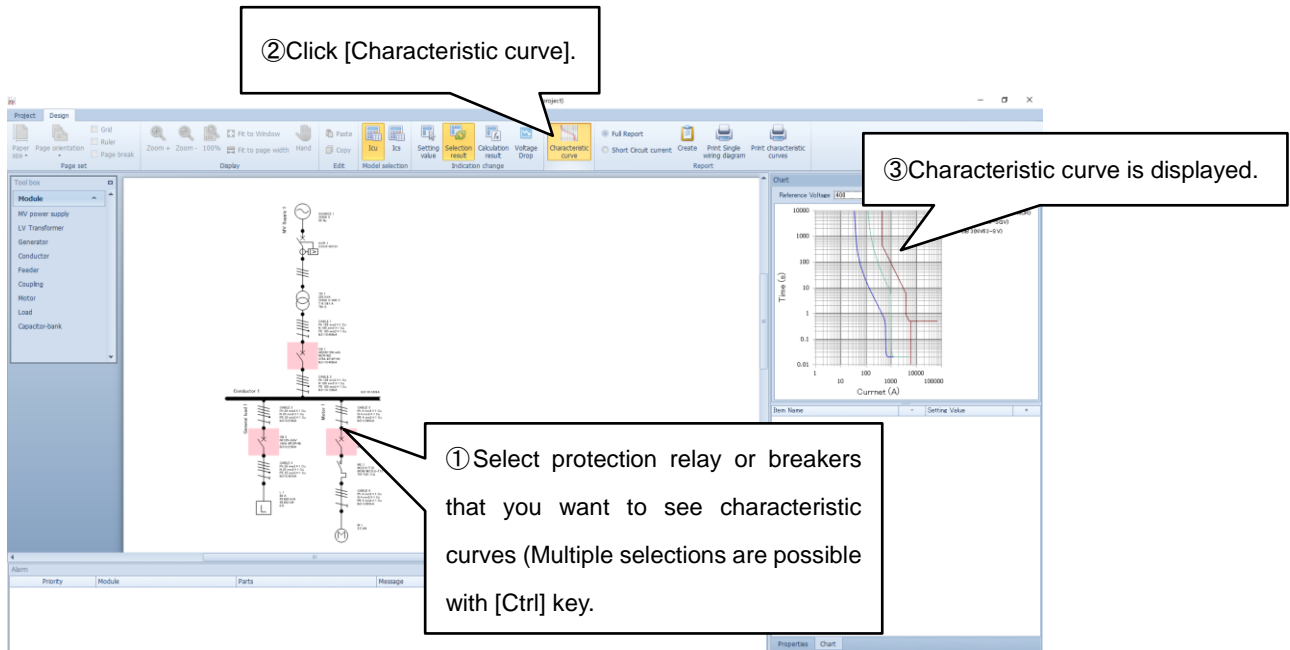
※The sizes of Cable/Busbar/Busduct are selected based on the capacity of power distribution. As for the connecting method of actual breaker, confirm by a catalog and/or a technical documents.

(4) Besides, when you change parameter such as “Residual current protection (Yes/No)”, “ACB/MCCB/MCB” or of other elements, recalculate by [Icu] or [Ics] and reselect models.



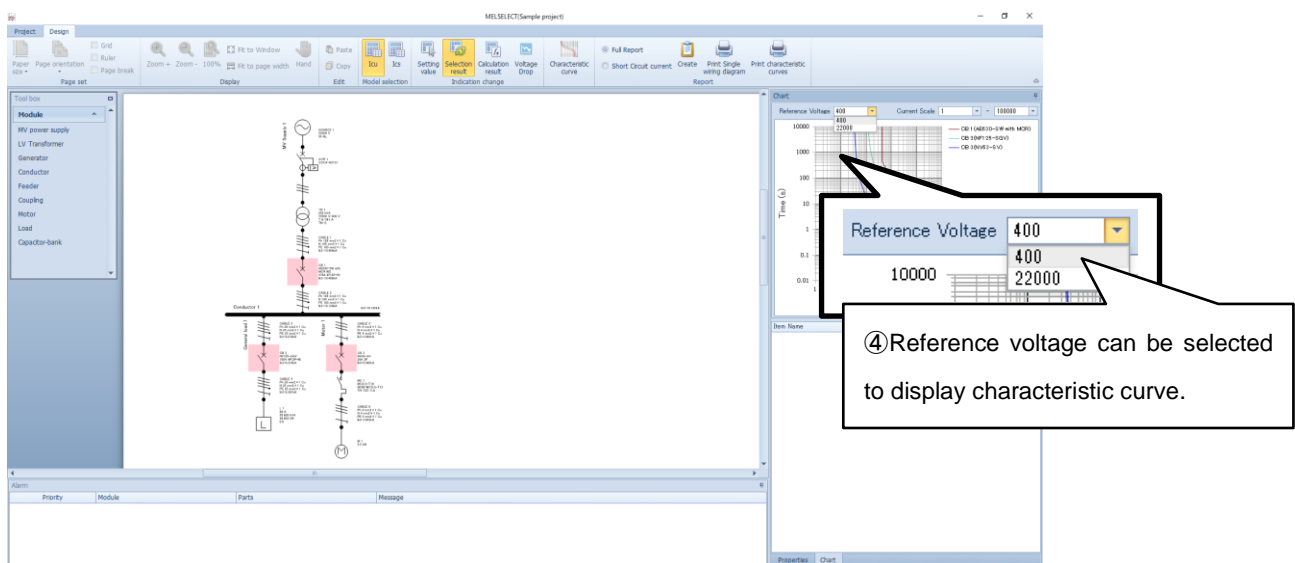
## 4.3 Display characteristic curve

- (1) MELSELECT enables to display characteristic curve of selected breakers and the set protection relays. Then you can check a coordination between breakers and protection relays.
- (2) For the selection results, select a breaker and a protection relay that you display characteristic curves by pressing [Ctrl] key and click [Characteristic curve]. Then the characteristic curves of each device are displayed on the right side. It is possible to show up to 10 characteristic curves.

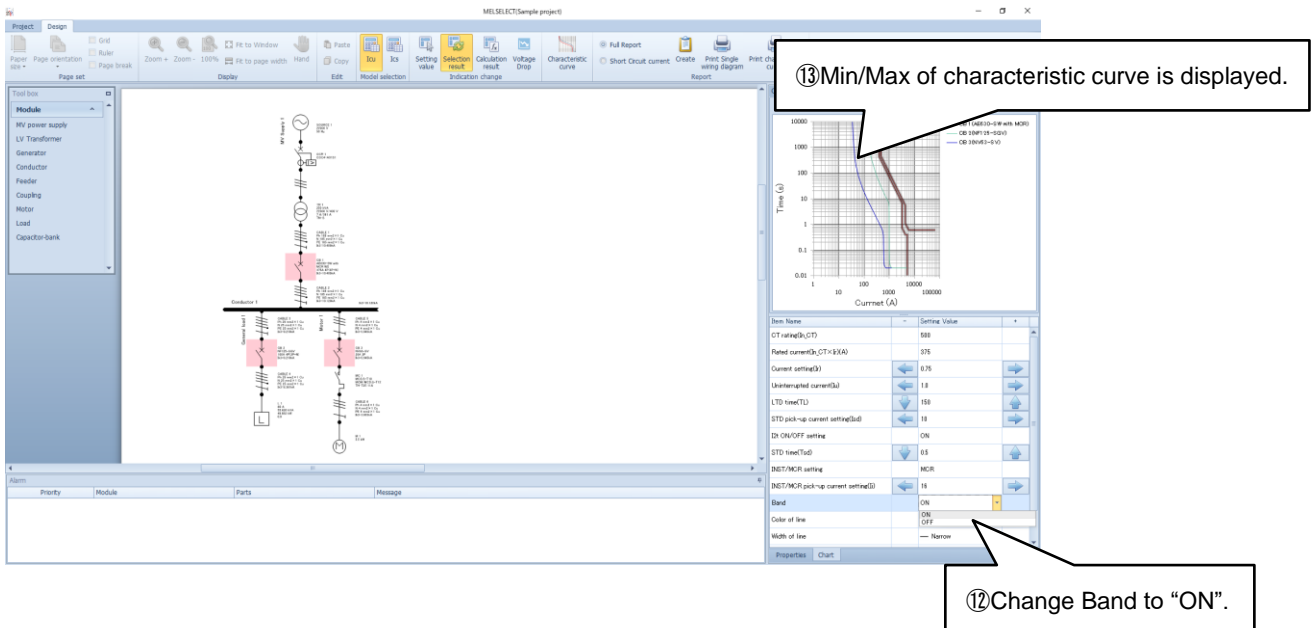
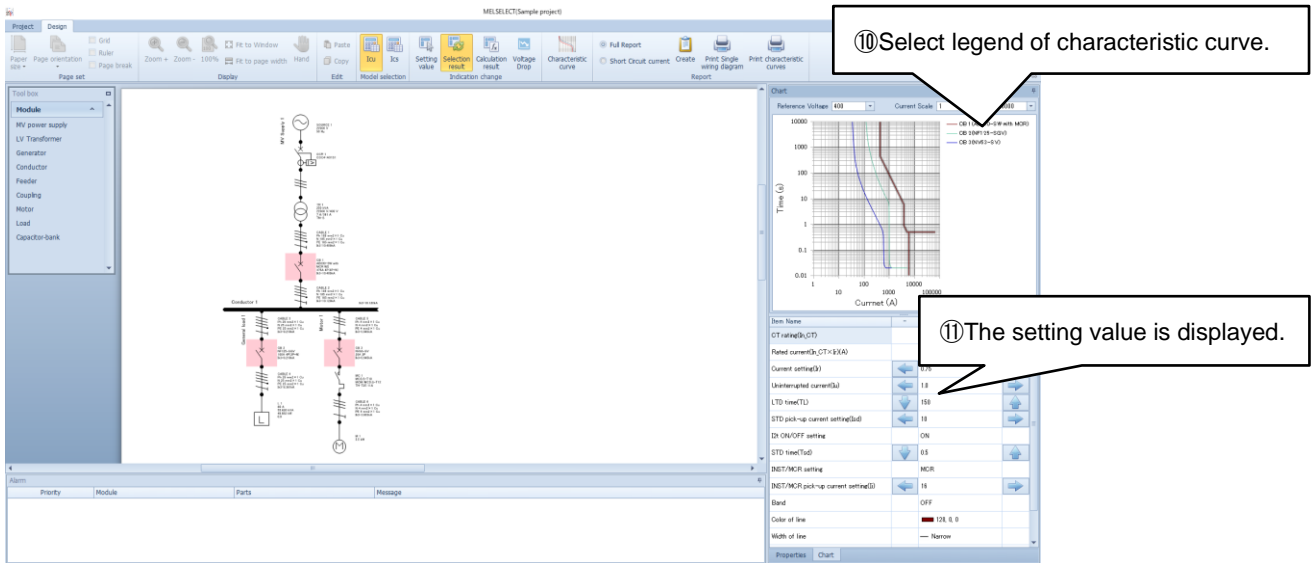


A reference voltage which display characteristic curve can be selected from the primary voltage/ the secondary voltage of each transformer included in the single-line diagram.

Select it from [Reference voltage] in the top of the displayed characteristic curve.



- (3) The default of characteristic curve is central value. If you change the characteristic curve to Max or Min, select the legend of characteristic curve, change Band to “ON” and change the value.



(4) When selected breaker is adjustable-type, it is possible to change each setting value of characteristic curve. Change the setting value and it will be reflected to the characteristic curve.

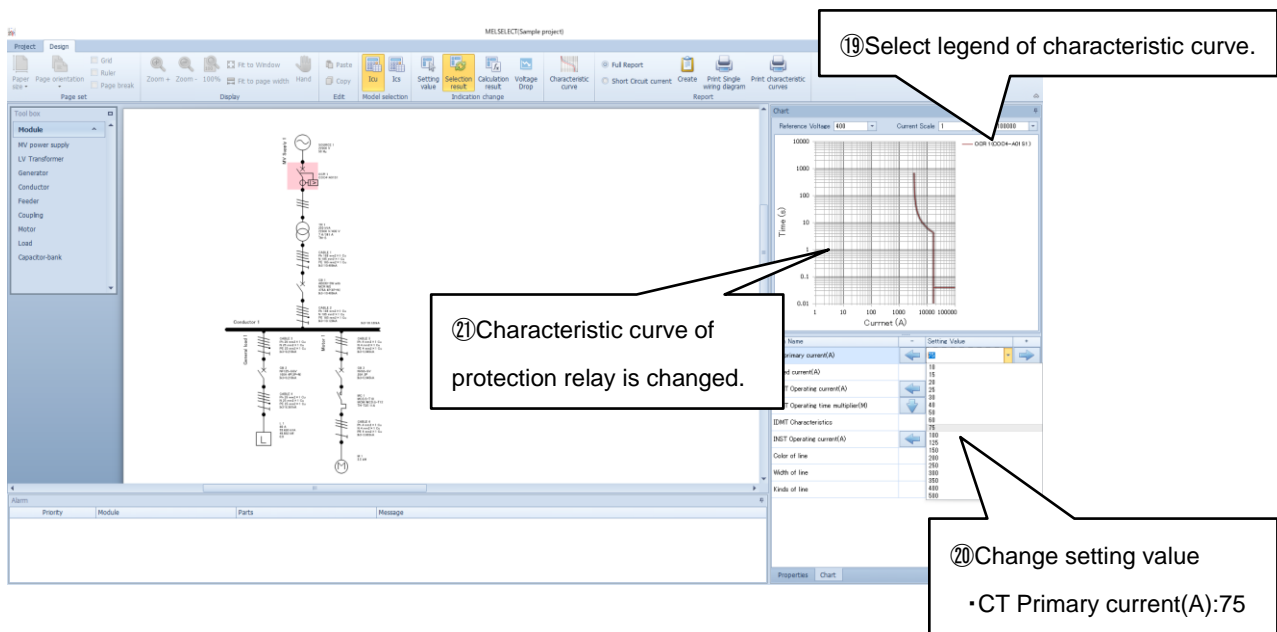
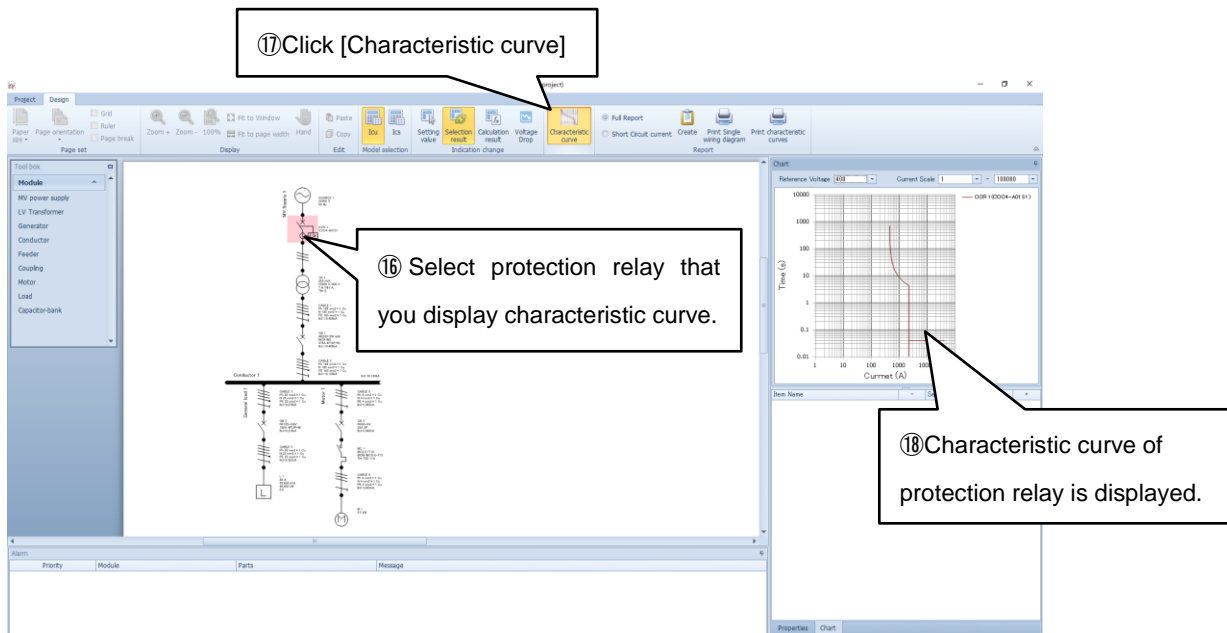
⑮ Changed settings of characteristic curve are reflected.

Item Name	-	Setting Value	+
CT rating(In <sub>CT</sub> )		500	
Rated current(In <sub>CT</sub> × I <sub>r</sub> )(A)		375	
Current setting(I <sub>r</sub> )	←	0.75	→
Uninterrupted current(I <sub>u</sub> )	←	0.5 0.55 0.6 0.65 0.7	
LTD time(T <sub>L</sub> )	↓	0.65 0.7 0.75	
STD pick-up current setting(I <sub>sd</sub> )	←	0.75 0.8 0.85	
I <sub>2</sub> t ON/OFF setting		0.9 0.95 1.0	
STD time(T <sub>sd</sub> )	↓		
INST/MCR setting		MCR	

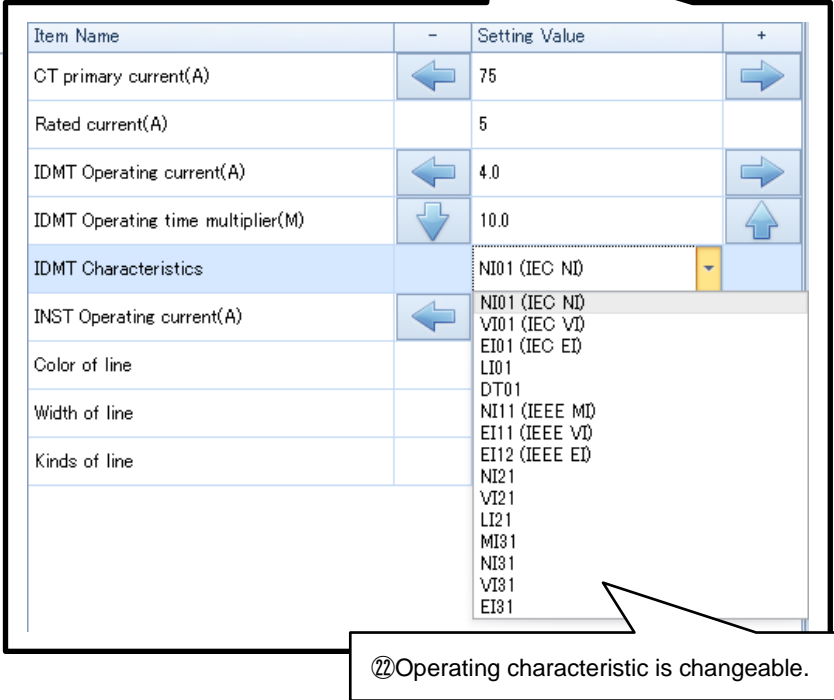
⑭ Each setting value of characteristic curve is changeable.



(5) The characteristic curve of the protection relay is determined only by the setting value regardless of the short-circuit current calculation. As the same as the breaker, each setting value is able to display and change by selecting the protection relays.



(6) The protection relay can also change the operating characteristic corresponding to the set model.



## 5. Generate report

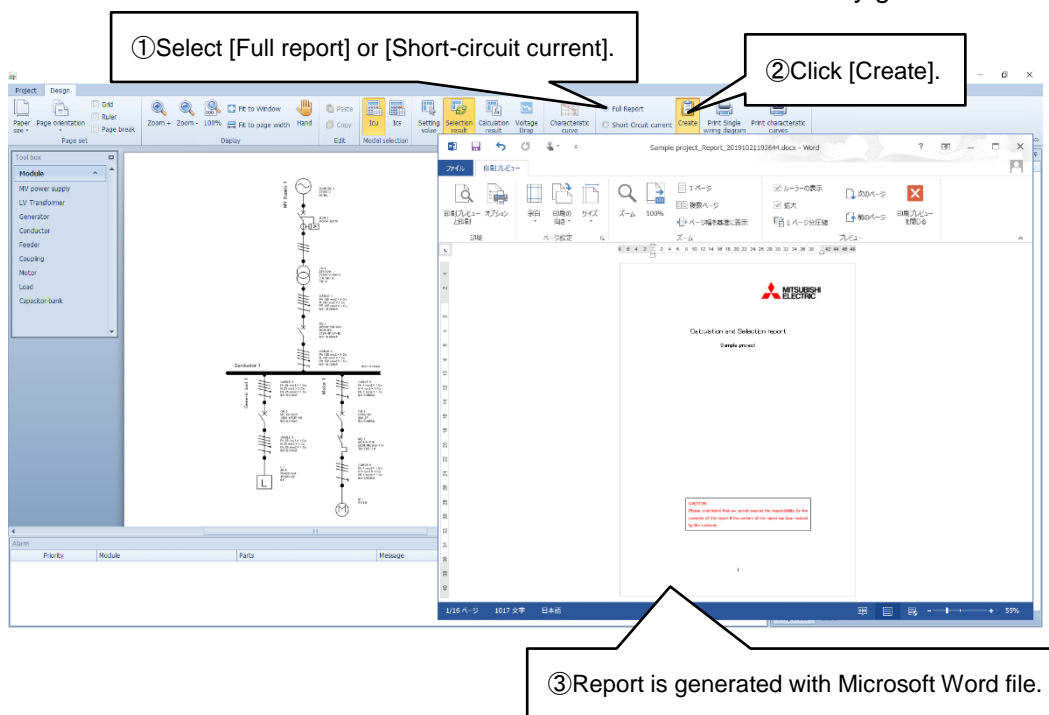
### 5.1 Generating report of short-circuit current calculation and result of model selection

(1) MELSELECT can create a report of [Full report] or [Short-circuit current], click a suitable form.

Table 6. Report types

Form	Short-circuit calculation results	Model selection results
Full report	○	○
Short-circuit current	○	—

(2) Click [Create] in report section on the upper side of the screen, and the report of short-circuit current calculation results and the results of model selection are automatically generated.



(3) Report is created as a file name as below, it is automatically saved to a folder of [Document] or [My document].

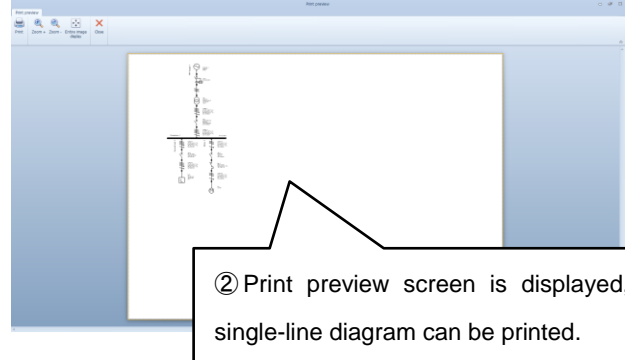
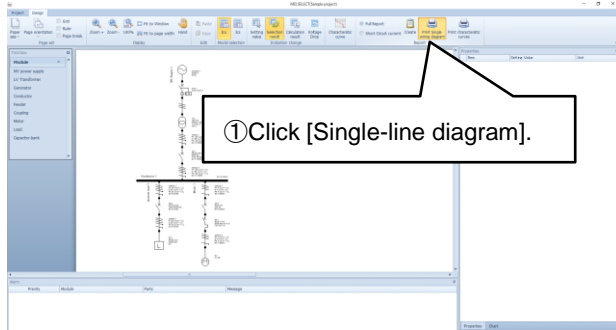
Table 7. File name of reports

Form	File names
Full report	[Project name]_Report_yyyyMMddHHmmss.docx
Short-circuit current	[Project name]_ShortCircuit_yyyyMMddHHmmss.docx

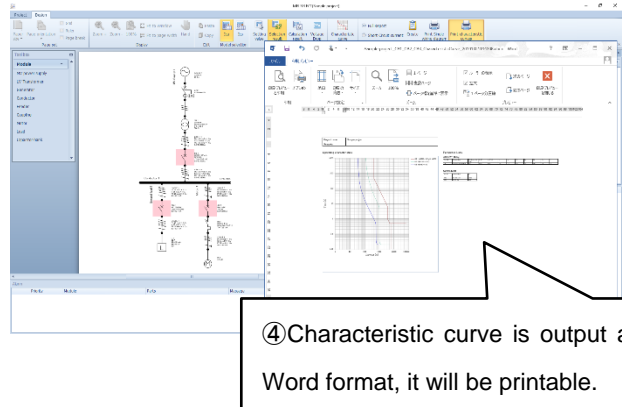
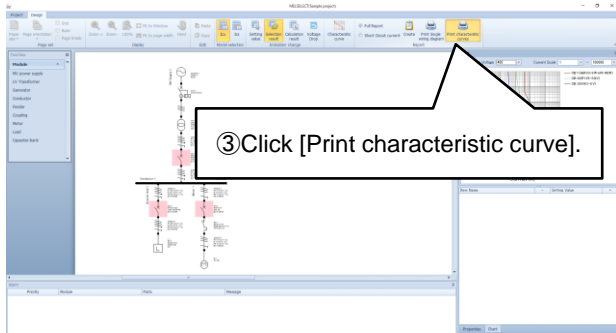
(4) If you create the report of [Full report] form, as for the item of [Single-line diagram], only the title of item is written and the single-line diagram is printed separately. See Content of 5.2 about the printing method of the single- diagram.

## 5.2 Print single-line diagram and characteristic curve

- (1) MELSELECT enables to print single-line diagram and characteristic curve as related materials.
- (2) Click [Print single-line diagram] in Report section to print the created single-line diagram which was created at drawing area.



- (3) By Clicking [Print Characteristic curves] in the report section, the created characteristic curves is output as Word format and it will be printable.



- (4)The created operating characteristic curve is created as below file name, they are automatically saved to [Document] or [My document] folder.

[Project name][Selected part name]\_CharacteristicCurve\_yyyyMMddHHmmss.docx

## 6. Appendix

### 6.1 Troubleshooting

Table 8. The contents of the trouble, the causes and solutions

No	Contents	Cause and solution
1	MELSELECT does not work	Check if OS is Windows10.
2		Check if it is Microsoft.NET Framework4.6.
3		Your OS language may be incompatible. Change the language setting to English/Chinese/Japanese and try again
4		The download may have failed. Download it again.
5	When calculating short-circuit current, error occurs	Change the setting condition referring to the error message.
6		Make sure each element is correctly arrange and connected.
7		There might be no suitable model. Reconsider the calculation conditions.

## 6.2 The list of setting parameters for the elements

Table 9. The list of setting parameters for the elements

Elements	Setting parameters
Power	Voltage [V] 3000/3300/6000/6600/10000/11000/13800/15000/20000/22000/25000/30000/33000/35000
	Short-circuit capacity [MVA] 1000
Protection relay	Type No/MELPRO-D (1A)/MELPRO-D (5A)/MELPRO-S (5A)
	MV protection device CFP1-A41D1-E**1/CAC1-A41D1-E**1 (In case of MELPRO-D(1A)) CFP1-A41D1-E**5/CAC1-A41D1-E**5 (In case of MELPRO-D(5A)) COC4-A01S1 (In case of MELPRO-S(5A))
Transformer	Secondary voltage [V] 100/20/230/240/380/400/415/440/500/525/660/690
	Earthing system TN-S/TN-C/TT/IT
	Transformer capacity [kVA] 20/30/50/75/100/150/160/200/250/300/400/500/630/750/800/1000/1250/1500/2000/2500/3150
Generator	Voltage [V] 100/20/230/240/380/400/415/440/500/525/660/690
	Power distribution system TN-S/TN-C/TT/IT
	Capacity [kVA] 20/30/50/75/100/150/160/200/250/300/400/500/630/750/800/1000/1250/1500/2000/2500/3150
	Transient reactance [%] 0-100 (Arbitrary input)
	Sub- transient reactance [%] 0-100 (Arbitrary input)
	DC time constant [s] 0.01-100 (Arbitrary input)
	Sub-transient time constant [s] 0.001-100 (Arbitrary input)

Table 9.The list of setting parameters for the elements (Continued on previous page)

Element	Setting parameter
Cable	Length [m] 0.1-999 (Arbitrary input)
	Conductor material (Phase) Cu/Al
	Conductor material (PE) Cu/Al
	Insulating material PVC/XLPE
	Cable arrangement (Select it in the setting window)
	Cross sectional area [mm <sup>2</sup> ] 1.5/2.5/4/6/10/16/25/30/50/70/95/120/150/185/240/30 (Depending on a capacity of power distribution)
Busduct	Length [m] 0.1-999 (Arbitrary input)
	Number of poles 4P(3P+N)/3P (Depending on a earthing system)
	Conductor material (Phase) Cu/Al
	Conductor material (PE) Cu/Al
	Busduct size WxDxN 75mmx6mmx1/100mmx6mmx1/125mmx6mmx1/175mmx6mmx1/230mmx6mmx1/280mmx6mmx1 /200mmx6mmx1/280mmx6mmx2 (Depending of the capacity of power distribution) (In case of the conductor material (Phase) is Cu) 100mmx6mmx1/100mmx10mmx1/125mmx10mmx1/175mmx10mmx1/230mmx10mmx1 /280mmx10mmx1/200mmx10mmx2/280mmx10mmx2 (Depending of the capacity of power distribution) (In case of the conductor material (Phase) is Al)

Table 9.The list of setting parameters for the elements (Continued on previous page)

Elements	Setting parameters
Busbar	Length [m] 0.1-999 (Arbitrary input)
	Conductor material (Phase) Cu/Al
	Conductor material (PE) Cu/Al
	Horizontal installation factor 0.1-2 (Arbitrary input)
	Proximity effect factor 0.1-2 (Arbitrary input)
	<p>Busbar size WxDxN</p> <p>12mmx2mmx1/15mmx2mmx1/15mmx3mmx1/20mmx2mmx1/12mmx2mmx2/20mmx3mmx1/  15mmx2mmx2/25mmx3mmx1/20mmx5mmx1/30mmx3mmx1/15mmx3mmx2/20mmx2mmx2/  25mmx5mmx1/30mmx5mmx1/20mmx3mmx2/40mmx3mmx1/25mmx3mmx2/40mmx5mmx1/  20mmx5mmx2/30mmx3mmx2/50mmx5mmx1/25mmx5mmx2/40mmx3mmx2/30mmx5mmx2/  60mmx5mmx1/40mmx10mmx1/50mmx10mmx1/40mmx5mmx2/80mmx5mmx1/60mmx10mmx1/  100mmx5mmx1/50mmx5mmx2/60mmx5mmx2/80mmx10mmx1/40mmx10mmx2/100mmx10mmx1/  50mmx5mmx3/50mmx10mmx2/80mmx5mmx2/120mmx10mmx1/60mmx5mmx3/60mmx10mmx2/  40mmx10mmx3/100mmx5mmx2/50mmx5mmx4/50mmx10mmx3/80mmx10mmx2/80mmx5mmx3/  160mmx10mmx1/60mmx5mmx4/40mmx10mmx4/60mmx10mmx3/100mmx10mmx2/100mmx5mmx3/  80mmx5mmx4/50mmx10mmx4/80mmx10mmx3/120mmx10mmx2/60mmx10mmx4/100mmx5mmx4/  100mmx10mmx3/160mmx10mmx2/80mmx10mmx4/120mmx10mmx3/100mmx10mmx4/  160mmx10mmx3/150mmx10mmx4/200mmx10mmx4</p> <p>(Depending of the capacity of power distribution) (In case of the conductor material (Phase) is Cu)</p> <p>12mmx2mmx1/15mmx2mmx1/15mmx3mmx1/20mmx2mmx1/12mmx2mmx2/20mmx3mmx1/  15mmx2mmx2/25mmx3mmx1/20mmx5mmx1/30mmx3mmx1/15mmx3mmx2/20mmx2mmx2/  25mmx5mmx1/30mmx5mmx1/20mmx3mmx2/40mmx3mmx1/25mmx3mmx2/40mmx5mmx1/  20mmx5mmx2/30mmx3mmx2/50mmx5mmx1/25mmx5mmx2/40mmx3mmx2/30mmx5mmx2/  60mmx5mmx1/40mmx10mmx1/50mmx10mmx1/40mmx5mmx2/80mmx5mmx1/60mmx10mmx1/  100mmx5mmx1/50mmx5mmx2/60mmx5mmx2/80mmx10mmx1/40mmx10mmx2/100mmx10mmx1/  50mmx5mmx3/50mmx10mmx2/80mmx5mmx2/120mmx10mmx1/60mmx5mmx3/60mmx10mmx2/  40mmx10mmx3/100mmx5mmx2/50mmx5mmx4/50mmx10mmx3/80mmx10mmx2/80mmx5mmx3/  160mmx10mmx1/60mmx5mmx4/40mmx10mmx4/60mmx10mmx3/100mmx10mmx2/100mmx5mmx3/  80mmx5mmx4/50mmx10mmx4/80mmx10mmx3/120mmx10mmx2/60mmx10mmx4/100mmx5mmx4/  100mmx10mmx3/160mmx10mmx2/80mmx10mmx4/120mmx10mmx3/100mmx10mmx4/  160mmx10mmx3/150mmx10mmx4/200mmx10mmx4</p> <p>(Depending on the capacity of power distribution) (In case of the conductor material (Phase) is Al)</p>



Table 9.The list of setting parameters for the elements (Continued on previous page)

Elements	Setting parameters
Breaker	Type of circuit breakers ACB/MCCB/MCB
	Number of poles 4P(3P+N)/3P/2P/2P(1P+N) (Depending on a earthing system)
	Residual current protection Yes/No
	Electronic trip relay (ACB only) for General use (WS)/for Generator protection use (WM)/for Special use (WB)/ for Coordination use (WF)
Capacitor-bank	Capacitance [kvar] 5/10/15/20/25/30/40/50/75/100/150/200/250/300/400/500/600/750
	Reactor [%] 6/13
Load	Load current [A] 0.1-8267 (Arbitrary input)
	Power factor 0-1 (Arbitrary input)
	Capacity [kVA] 0.038-3150 (Arbitrary input)
	Output [kW] 0.004-3150 (Arbitrary input)
Motor	Starting method Direct-to-line starting/Star-Delta starting
	Output [kW] 0.1/0.2/0.4/0.75/1.5/2.2/3.7/5.5/7.5/11/15/18.5/22/30/37/45/55/75/90/110/132/160/200 (In case of the Direct-to-line starting) 5.5/7.5/11/15/18.5/22/30/37/45/55/75/90/110/132/160/200/250/300 (In case of the Star-Delta starting)

# Mitsubishi Electric Selection Software(MELSELECT) for Mitsubishi Electric low-voltage circuit breaker

## ■Service Network

Country/Region	Corporation Name	Address	Telephone
Australia	Mitsubishi Electric Australia Pty. Ltd.	348 Victoria Road, Rydalmere, N.S.W. 2116, Australia	+61-2-9684-7777
Bangladesh	PROGRESSIVE TRADING CORPORATION	HAQUE TOWER,2ND FLOOR,610/11,JUBILEE ROAD, CHITTAGONG, BANGLADESH	+880-31-624307
	ELECTRO MECH AUTOMATION& ENGINEERING LTD.	SHATABDI CENTER, 12TH FLOOR, SUITES : 12-B, 292, INNER CIRCULAR ROAD, FAKIRA POOL, MOTIJHEEL, DHAKA-1000, BANGLADESH	+88-02-7192826
Belarus	Tehnikon	Oktyabrskaya 19, Off. 705, BY-220030 Minsk, Belarus	+375 (0)17 / 210 46 26
Belgium	Koning & Hartman B.V.	Woluwelaan 31, BE-1800 Vilvoorde, Belgium	+32 (0)2 / 2570240
Brazil	Mitsubishi Electric Do Brasil Comercio E Servicos Ltda.	Av. Adelino Cardana, 293 -21 and. - Bethaville, 06401-147, Barueri/SP - Brasil	+55-11-4689-3000
Cambodia	DHINIMEX CO.,LTD	#245, St. Tep Phan, Phnom Penh, Cambodia	+855-23-997-725
Chile	Rhona S.A.	Vte. Agua Santa 4211 Casilla 30-D (P.O. Box) Vina del Mar, Chile	+56-32-2-320-600
China	Mitsubishi Electric Automation (China) Ltd.	Mitsubishi Electric Automation Building, No.1386 Hongqiao Road, Shanghai,200336	+86-21-2322-3030
	Mitsubishi Electric Automation (China) Ltd. North China Branch	9/F, Office Tower1 Henderson Centre 18 Jianguomennei Dajie DongCheng district Beijing 100005	+86-10-6518-8830
	Mitsubishi Electric Automation (China) Ltd. NorthEast China Branch	Room2302,President Building Tower C,No.69 Heping North Avenue, Heping District,Shenyang,110003	+86-24-2259-8830
	Mitsubishi Electric Automation (China) Ltd. South China Branch	Room 2512-2516, Great China International Exchange Square, Jintian Rd.S., Futian District, Shenzhen, 518034	+86-755-2399-8272
	Mitsubishi Electric Automation (China) Ltd. South China Branch	Room 1609, North Tower, The Hub Center, No.1068, Xing Gang East Road, Haizhu District, GuangZhou, China 510335	+86-20-8923-6730
	Mitsubishi Electric Automation (China) Ltd. SouthWest China Branch	1501,1502,1503,15F,Guang-hua Centre,Block C,NO.98 Guang Hua North 3th Road Chengdu,610000	+86-28-8446-8030
	Mitsubishi Electric Automation (Hong Kong) Ltd.	20/F, Cityplaza One, 1111 king's Road, Taikoo shing, Hong Kong	+852-2510-0555
Colombia	Proelectrico Representaciones S.A.	Carrera 42 # 75-367 Bod 109 Itagui Colombia	+57-4-4441284
Czech Republic	AUTOCONT CONTROL SYSTEMS S.R.O	Technologická 374/6, CZ-708 00 Ostrava - Pustkovec	+420 595 691 150
Denmark	BEIJER ELECTRONICS A/S	LYKKEGARDSVEJ 17, DK-4000 ROSKILDE	+45 (0)46/ 75 76 66
Egypt	Cairo Electrical Group	9, Rostoum St. Garden City P.O. Box 165-11516 Maglis El-Shaab,Cairo - Egypt	+20-2-27961337
France	Mitsubishi Electric Europe B.V.	25, Boulevard des Bouvets, F-92741 Nanterre Cedex	+33 (0) 1 / 55 68 55 68
Germany	Mitsubishi Electric Europe B.V.	Mitsubishi-Electric-Platz 1, 40882 Ratingen, Germany	+49 (2102) 4860
Greece	KALAMARAKIS - SAPOUNAS S.A.	IONIAS & NEROMILOU STR., CHAMOMILOIS ACHARNES, ATHENS, 13678 Greece	+30-2102 406000
	UTECO	5, MAVROGENOUS STR., 18542 PIRAEUS, Greece	+30-211-1206-900
Hungary	Meltrade Ltd.	Fertő utca 14. HU-1107 Budapest, Hungary	+36 (0)1-431-9726
India	Mitsubishi Electric India Private Limited	2nd Floor, Tower A&B, Cyber Greens, DLF Cyber City, DLF Phase-III, Gurgaon - 122 022 Haryana, India	+91-124-4630300
Indonesia	PT.Mitsubishi Electric Indonesia	Gedung Jaya 8th floor, J.L.MH. Thamrin No.12 Jakarta Pusat 10340, Indonesia	+62-21-3192-6461
	P. T. Sahabat Indonesia	P.O.Box 5045 Kawasan Industri Pergudangan, Jakarta, Indonesia	+62-(0)21-6610651-9
Ireland	Mitsubishi Electric Europe B.V.	Westgate Business Park, Ballymount, IRL-Dublin 24, Ireland	+353 (0)1-4198800
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Korea	Mitsubishi Electric Automation Korea Co., Ltd	9F Gangseo Hangang xi-tower, 401 Yangcheon-ro, Gangseo-gu, Seoul 07528 Korea	+82-2-3660-9572
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Lithuania	Rifas UAB	Tinklu 29A, LT-5300 Panevezys, Lithuania	+370 (0)45-582-728
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Maroco	SCHIELE MAROC	KM 7,2 NOUVELLE ROUTE DE RABAT AIN SEBAA, 20600 Casablanca, Maroco	+212 661 45 15 96
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